United States
Department of
Agriculture

Soil Conservation
Service

In cooperation with
Virginia Polytechnic
Institute and State
University

Soil Survey of Prince William County, Virginia

How To Use This Soil Survey

General Soil Map

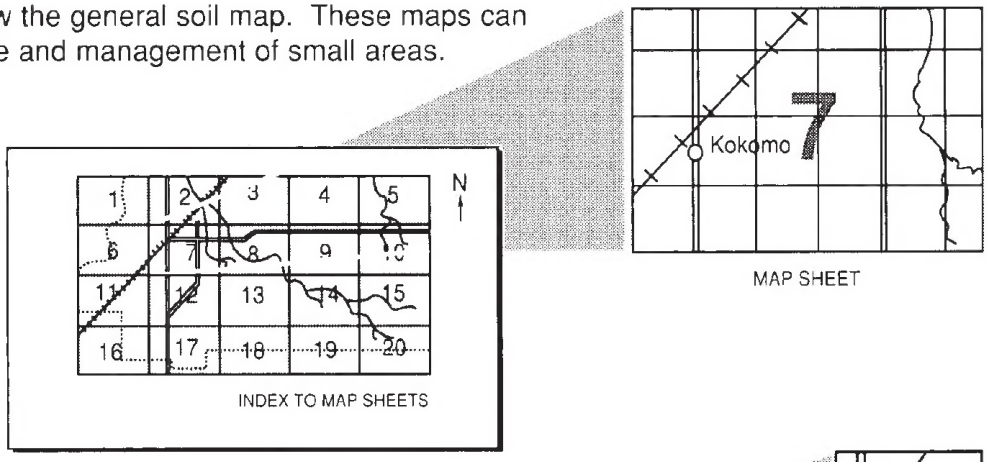
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.

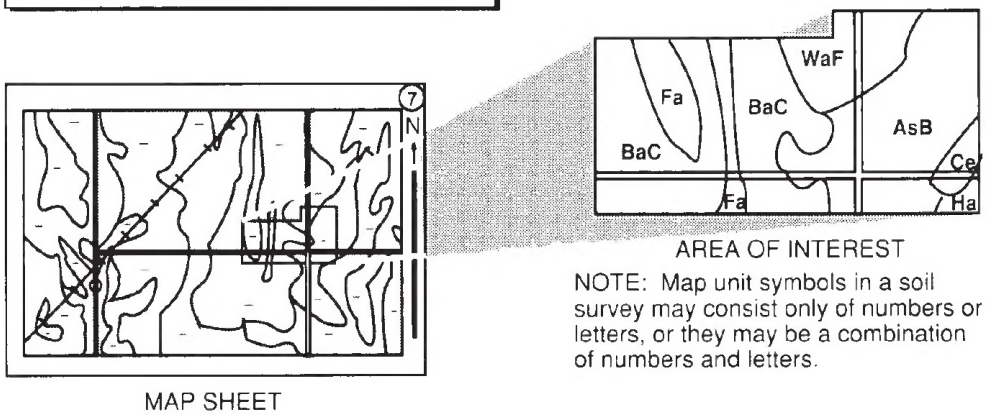
To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



INDEX TO MAP SHEETS

MAP SHEET

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.



MAP SHEET

AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, handicap, or age.

Major fieldwork for this soil survey was completed in 1964. Soil names and descriptions were approved in 1984. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1984. This survey was made cooperatively by the Soil Conservation Service and the Virginia Polytechnic Institute and State University. The Virginia Department of Conservation and Historic Resources and the Prince William County Board of Supervisors provided partial financing for the survey. The survey is part of the technical assistance furnished to the Prince William Soil and Water Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: This structure on Brentsville sandy loam, 2 to 7 percent slopes, was a hospital during the Battle of Manassas in the Civil War.

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Issued August 1989

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Summary of Tables

Foreword

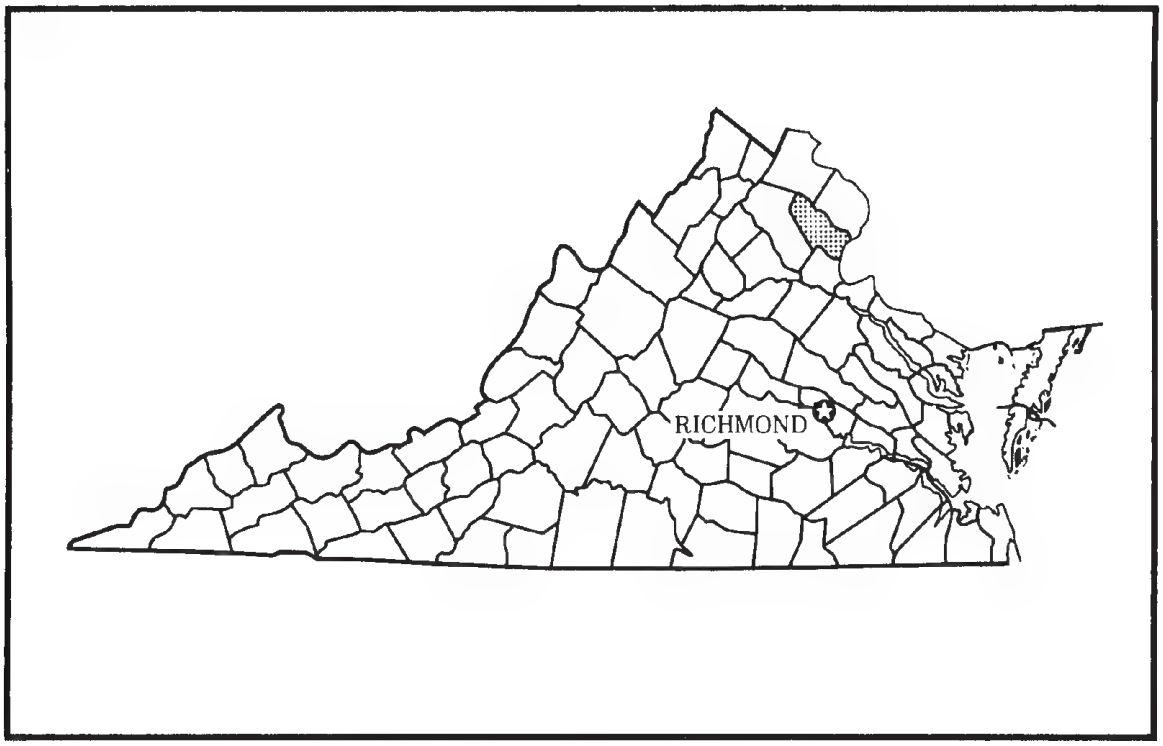
This soil survey contains information that can be used in land-planning programs in Prince William County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service or at the County Planning Office.

George C. Norris
State Conservationist
Soil Conservation Service



Location of Prince William County in Virginia.

Soil Survey of Prince William County, Virginia

By John H. Elder, Jr., Virginia Polytechnic Institute and State University

Fieldwork by Dwight L. Kaster, John F. Derting, and William J. Meyer

United States Department of Agriculture, Soil Conservation Service,
in cooperation with
Virginia Polytechnic Institute and State University

Prince William County is in the northeast part of Virginia, about 20 miles southwest of Washington, D.C. The survey area is 202,151 acres, which does not include the Quantico Marine Base. The elevation of the county ranges from sea level at its eastern boundary, the Potomac River, to 1,300 feet above sea level on Bull Run Mountain in the northwest part of the county. Much of the land in the county is woodland, but the demand for land for housing and industrial and commercial uses has been increasing. The main traffic arteries in the county are Interstate Routes 66 and 95.

Climate

Prepared by the Virginia Polytechnic Institute and State University.

Table 1 provides data on temperature and precipitation for the survey area as recorded at Manassas in the period 1951-81. Table 2 shows the probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on the length of the growing season.

In winter the average temperature is 36.8° F, and the average daily minimum temperature is 27.0°. The lowest temperature on record, which occurred at Manassas on January 18, 1957, is -4°. In summer the average temperature is 75.5°, and the average daily maximum temperature is 87.3°. The highest recorded temperature, which occurred at Manassas on July 16, 1980, is 104°.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40° F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 36.3 inches. Of this, 20.2 inches, or 56 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in April through September is less than 16.3 inches. The heaviest 1-day rainfall during the period of record was 6 inches at Manassas on September 14, 1966. Thunderstorms occur on about 11 days each year, and most occur in summer.

Average seasonal snowfall is 15.3 inches. The greatest snow depth at any one time during the period of record was 24 inches. On an average of 4 days, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 50 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 70 percent of the time in summer and about 50 percent of the time in winter. The prevailing wind is from the south. Average windspeed is highest, 8 miles per hour, in spring.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a

discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material has few or no roots or other living organisms and has been changed very little by other biologic activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, acidity, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties in terms of expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and new interpretations sometimes are developed to meet local needs. Data were assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management were assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can state with a fairly high degree of probability that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic

class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. These latter soils are called inclusions or included soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soil on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows the map units in this survey area. Each unit has a distinctive pattern of soils, relief, and drainage. Each is a unique natural landscape. Typically, a unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Some of the boundaries and soil names on this map do not match those on the maps of adjoining counties. These differences are the results of differences in the detail of mapping, changes in soil classification, and differences in the proportions of the same soils in the adjoining counties. In some of those different areas, the soils on the adjoining map are similar to those shown in Prince William County.

Soil Descriptions

Soils on Bull Run Mountain that formed in residuum of interbedded quartzites and muscovite schists

1. Airmont-Weverton-Stumptown

Very deep and moderately deep, moderately well drained and well drained soils that have a loamy subsoil and many flagstones

This unit consists of gently sloping to very steep soils on narrow ridges and valley walls of mountain uplands. The rock fragment content is commonly high throughout these soils, and outcrops of quartzite are common at the surface. The elevation of this unit ranges from about 500 to 1,300 feet above sea level.

This unit makes up about 3 percent of the survey area. The unit is about 25 percent Airmont soils, 20 percent Weverton soils, 15 percent Stumptown soils, and 40 percent soils of minor extent.

The Airmont and Weverton soils are in a complex and are on the broader ridges and side slopes. Both soils are very deep. The Airmont soils are moderately well drained and have a slowly permeable fragipan in the subsoil. The Weverton soils are well drained and have a subsoil that has a texture range of clay loam to clay.

The Stumptown soils are dominantly on the narrower ridges, ridge points, and very steep side slopes. These soils are well drained and moderately deep.

The dominant minor soils in this unit are well drained Braddock soils, poorly drained Baile and Hatboro soils, and moderately well drained and somewhat poorly drained Codorus soils. The Braddock soils are on mountain toe slopes, and the Baile soils are in colluvial swales. The Hatboro and Codorus soils are on flood plains.

This map unit is largely a mixed forest of oak, pine, and other similar species. The understory consists largely of mountain-laurel and other acid-tolerant species. Some areas of the unit are used for year-round and vacation housing.

Slope, the high content of rock fragments in the soils, and slow permeability are the main limitations of the unit.

Soils on the Piedmont Plateau that formed in residuum of sedimentary rocks of siltstone, sandstone conglomerate, and basic rocks of diabase and basalt

2. Jackland-Waxpool-Legore

Very deep, poorly drained to well drained soils that have a clayey or loamy subsoil

This unit consists of nearly level to moderately steep soils on upland ridges and side slopes underlain mainly by diabase and basalt. Cobblestones and boulders of

diabase are common in a few areas, and outcrops are on the steeper slopes. The elevation of this unit commonly ranges from about 250 to 450 feet above sea evel.

This unit makes up about 8 percent of the survey area. The unit is about 30 percent Jackland soils, 30 percent Waxpool soils, 8 percent Legore soils, and 32 percent soils of minor extent.

The Jackland soils are dominantly on broad, gently sloping ridges. These soils are moderately well drained and somewhat poorly drained and have a high content of clay in the subsoil. They are underlain by strongly weathered diabase or basalt rock.

The Waxpool soils are dominantly on broad, nearly level areas. These soils are poorly drained and have a high content of clay in the subsoil. Ponding is common on much of the area of these soils during winter and spring.

The Legore soils are on narrow, gently sloping ridges and short, moderately steep side slopes. These soils are wel drained and are underlain by partially weathered diabase or basalt rock. Bedrock outcrops are common on a few areas.

The dominant minor soils in this unit are generally strongly sloping Oakhill, Haymarket, and Kelly soils. The Oakhill soils are moderately deep and well drained. The Haymarket soils are well drained and moderately well drained and have a high content of clay. The Kelly soils are deep and somewhat poorly drained are underlain by weathered hornfels and granulite.

This unit is dominantly mixed hardwoods and pine. A few areas are used mainly for pasture and hay.

The high content of clay, seasonal wetness, and slow permeability are the main limitations of the unit.

3. Sudley-Oatlands-Manassas

Very deep and moderately deep, well drained and moderately well drained soils that have a loamy subsoil

This unit consists of gently sloping and strongly slop ng soils on upland ridges and side slopes underlain by sandstone and conglomerate. The elevation of the unit commonly ranges from about 310 to 470 feet above sea level.

This unit makes up about 3 percent of the survey area. The unit is about 20 percent Sudley soils, 20 percent Oat ands soils, 18 percent Manassas soils, and 42 percent soils of minor extent.

The Sudley soils are dominantly on broad, gently sloping ridges. These soils are very deep and well dra ned

The Oatlands soils are on broad areas on gently sloping ridges and strongly sloping side slopes. These soils are moderately deep and well drained. Sandstone and conglomerate outcrops are on a few areas.

The Manassas soils are in gently sloping depressional areas and along drainageways. These soils are very deep and well drained and moderately well drained. Wet spots are in a few places, and these soils are subject to seepage and runoff from higher areas.

The dominant minor soils in this unit are deep, moderately well drained and somewhat poorly drained Dulles soils; moderately deep, well drained Arcola soils; shallow, well drained Nestoria soils; and deep, poorly drained Albano soils. The Albano soils are in colluvial areas. The Dulles soils are on broad, slightly concave uplands. The Arcola and Nestoria are on sloping to very steep side slopes. Well drained Bermudian soils and moderately well drained to somewhat poorly drained Rowland soils are in a few areas on flood plains.

This unit is largely used for the general crops of the area. Some of the acreage is used for homesites, and a few small areas are forests of mixed hardwoods and pines.

The depth to bedrock and droughtiness in places are the main limitations of the unit.

4. Arcola-Panorama-Nestoria

Moderately deep, deep, and shallow soils that are well drained and have a loamy subsoil

This unit consists of gently sloping to very steep soils on r dges and side slopes of the Triassic portion of the Piedmont Plateau. The soils are underlain by siltstone and sandstone and in places are capped with old alluvial sediments. They contain a few rock fragments consisting largely of partially weathered siltstone and sandstone and in places rounded quartz gravel. The elevation of the unit ranges from about 150 to 400 feet above sea level.

This unit makes up about 33 percent of the survey area. The unit is about 30 percent Arcola soils, 10 percent Panorama soils, 8 percent Nestoria soils, and 52 percent soils of minor extent.

The Arcola soils are on dominantly gently sloping ridges and strongly sloping side slopes. They are moderately deep and are underlain by partially weathered, red siltstone or fine grained sandstone.

The Panorama soils are on gently sloping or strongly sloping ridges and side slopes. These soils are deep. Quartzite or quartz gravel is on the surface and throughout the upper part of the soil.

The Nestoria soils are on strongly sloping ridges and

steep side slopes. They are shallow to bedrock. Siltstone and sandstone rock fragments are common on the surface and throughout the soil.

The dominant minor soils in the unit are deep, moderately well drained and somewhat poorly drained Dulles soils on broad, level to slightly concave ridges and around the heads of drainageways; very deep, well drained and moderately well drained Manassas soils along drainageways and in depressions; and deep, poorly drained Albano soils along drainageways and in depressions. Very deep, well drained Bermudian soils and deep, somewhat poorly drained and moderately well drained Rowland soils are in a few areas on flood plains.

This unit is used largely for the general crops of the area. Some of the acreage is used for homesites and industrial and commercial areas.

The depth to bedrock, droughtiness, and slow permeability are the main limitations of the unit.

5. Dulles-Reaville-Albano

Deep and moderately deep, moderately well drained to poorly drained soils that have a clayey or loamy subsoil

This unit consists of nearly level and gently sloping soils on broad ridges underlain by siltstone and sandstone. The elevation of the unit commonly ranges from about 160 to 260 feet above sea level.

This unit makes up about 5 percent of the survey area. The unit is about 25 percent Dulles soils, 15 percent Reaville soils, 15 percent Albano soils, and 45 percent soils of minor extent.

The Dulles soils are dominantly on broad upland flats and at the heads of drainageways. These soils are deep and moderately well drained and somewhat poorly drained. They formed partly in residuum from siltstone and sandstone and partly in colluvial or alluvial sediments.

The Reaville soils are moderately deep and moderately well drained and somewhat poorly drained. They are dominantly on nearly level and gently sloping ridges and side slopes. They formed in residuum from siltstone or sandstone.

The Albano soils are deep and poorly drained and are on broad, level to slightly concave ridges and along drainageways. They developed partly in residuum and partly in colluvial or alluvial sediments.

The dominant minor soils are moderately deep, well drained Arcola and Nestoria soils on ridges and side slopes and very deep, well drained and moderately well drained Manassas soils in swales and depressional areas. The unit has a few areas of soils on bottom lands and low terraces.

This unit is used dominantly for farming. The better drained soils are suitable for row crops, and the more poorly drained soils are suitable for pasture and hay.

Wetness, slow permeability, and the depth to bedrock in places are the main limitations of the unit.

Soils on the Piedmont Plateau uplands that formed in residuum of metamorphic rocks of muscovite schist, granite gneiss and hornblende gneiss, and schist

6. Buckhall-Glenelg-Occoquan

Very deep and deep, well drained and somewhat excessively drained soils that have a clayey or loamy subsoil

This unit consists of gently sloping to very steep soils on upland ridges and side slopes. The soils are underlain dominantly by granite gneiss or other similar types of rock. Many areas on the broader ridges are capped with old alluvial sediments. Vein quartz gravel and cobblestones are common in the soils, and outcrops are on a few places on the steeper side slopes. The elevation of the unit commonly ranges from about 100 to 430 feet above sea level.

This unit makes up about 11 percent of the survey area. The unit is about 30 percent Buckhall soils, 15 percent Glenelg soils, 15 percent Occoquan soils, and 40 percent soils of minor extent.

The Buckhall soils are on gently sloping and strongly sloping ridges and side slopes. These soils are very deep and well drained and are underlain by strongly weathered granite gneiss saprolite.

The Glenelg soils are on gently sloping to moderately steep ridges and side slopes. These soils are very deep and well drained. They are underlain by micaceous, sandy-loam saprolitic material from schists and mica gneiss.

The Occoquan soils are on narrow, strongly sloping ridges and moderately steep and very steep side slopes. These soils are deep and well drained to somewhat excessively drained and are underlain by weathered granite gneiss. Bedrock outcrops are on the steeper slopes.

The dominant minor soils in this unit are very deep, well drained and moderately well drained Meadowville soils and very deep, poorly drained Baile soils in depressional areas and along drainageways; very deep, moderately well drained and somewhat poorly drained

Hoadly soils at the heads of drainageways, in saddles, and on toe slopes; very deep, well drained Fairfax soils on broad, sloping ridges; and very deep, well drained Gaila soils on strongly sloping to very steep side slopes.

This unit is dominantly a forest of mixed hardwoods and pines. A few areas are used for general farm crops, and some of the acreage is used for residential development.

High content of clay, wetness in some areas, slope, and slow permeability are the main limitations of the unit.

7. Gaila-Buckhall-Occoquan

Very deep and deep, well drained and somewhat excessively drained soils that have a loamy subsoil

This unit consists of gently sloping to very steep soils on upland ridges and side slopes and in swales. The soils are underlain dominantly by muscovite schist. Many areas on the broader ridges are capped with old alluvial sediments. Angular vein quartz gravel and cobblestones are in some areas, and outcrops are on some of the steepest side slopes. The elevation of the unit commonly ranges from about 100 to 400 feet above sea level.

This unit makes up about 19 percent of the survey area. The unit is about 30 percent Gaila soils, 20 percent Buckhall soils, 10 percent Occoquan soils, and 40 percent soils of minor extent.

The Gaila soils are dominantly on moderately steep to very steep side slopes. They are very deep and well drained and are underlain by micaceous saprolite from mica schist.

The Buckhall soils are on gently sloping and strongly sloping ridges and side slopes. These soils are very deep and well drained and are underlain by strongly weathered granite gneiss saprolite.

The Occoquan soils are on narrow, strongly sloping ridges and moderately steep and very steep side slopes. They are deep and well drained to somewhat excessively drained and are underlain by weathered granite gneiss. Bedrock outcrops are on some of the steeper slopes.

The dominant minor soils are moderately well drained to somewhat poorly drained Glenville soils and poorly drained Baile soils along drainageways and in depressional areas; Glenelg and Elioak soils on gently sloping to moderately steep ridges and side slopes; and well drained Fairfax soils and moderately well drained Neabsco soils on broad ridges.

This unit is dominantly a forest of mixed hardwoods and pines. A few areas are used for general farm crops, and some of the acreage is used for residential development.

Slope, slow permeability and wetness in places, and high content of mica are the main limitations of the unit.

8. Spriggs-Orenda-Minnieville

Moderately deep and very deep, well drained soils that have a loamy or clayey subsoil

This unit consists of gently sloping ridges and strongly sloping to very steep side slopes. A few areas on the broad ridges are capped with old alluvial sediments. Outcrops are in a few places on the steeper slopes. The elevation of this unit ranges from about 100 to 350 feet above sea level.

This unit makes up about 2 percent of the survey area. The unit is about 25 percent Spriggs soils, 20 percent Orenda soils, 15 percent Minnieville soils, and 40 percent soils of minor extent.

The Spriggs soils are dominantly on moderately steep to very steep side slopes. These soils are moderately deep, have a thin, loamy to clayey subsoil, and are underlain by hornblende gneiss or schist.

The Orenda soils are on strongly sloping ridges and side slopes. These soils are very deep, have a clayey subsoil, and are underlain by weathered hornblende gneiss or schist.

The Minnieville soils are on gently sloping ridges and strongly sloping side slopes. These soils are very deep, have a clayey subsoil, and are underlain by weathered hornblende gneiss and schist.

The dominant minor soils are well drained Meadowville soils and poorly drained Baile soils in depressional areas and along drainageways and well drained Fairfax soils and moderately well drained Neabsco soils on ridges.

This unit is dominantly a forest of mixed hardwoods and pines. A few areas are used for general farm crops, and some of the acreage is used for residential development.

A high content of clay and slow permeability are the main limitations of the unit.

Coastal Plain soils that formed in fluviomarine sediments of sand, silt, clay, and gravel

9. Neabsco-Quantico-Dumfries

Very deep, moderately well drained or well drained soils that have a loamy or clayey subsoil

This unit consists of nearly level to very steep soils

on high terraces. The soils are underlain by unconsolidated sediments of sand, silt, and clay. Rounded quartz and quartzite gravel are on the surface and throughout the soils in a few places. The elevation of the unit commonly ranges from about 50 to 400 feet above sea level.

This unit makes up about 5 percent of the survey area. The unit is about 30 percent Neabsco soils, 25 percent Quantico soils, 15 percent Dumfries soils, and 30 percent soils of minor extent.

The Neabsco soils are dominantly on broad, nearly level to strongly sloping ridges. These soils are very deep and moderately well drained and have a very slowly permeable fragipan and a loamy subsoil.

The Quantico soils are dominantly on gently sloping to moderately steep ridges and side slopes. They are very deep and well drained, and they have a clayey subsoil.

The Dumfries soils are dominantly on moderately steep to very steep side slopes. These soils are very deep and well drained and have a loamy subsoil.

The dominant minor soils are deep, well drained Watt soils on side slopes and ridge points where downcutting by streams has exposed the graphitic schist to weathering; somewhat poorly drained Lunt soils on toe slopes, in saddles, and on low ridges and side slopes; and moderately well drained to somewhat poorly drained Codorus soils and poorly drained Hatboro soils on flood plains along the major streams.

This unit is dominantly a forest of mixed hardwoods and pines. A few areas are used for general farm crops, and some of the acreage is used for residential and industrial development.

Slow permeability, wetness, high content of clay, and slope are the main limitations of the unit.

10. Dumfries-Lunt-Marr

Very deep, well drained soils that have a loamy or clayey subsoil

This unit consists of gently sloping to very steep soils on terraces. The soils are underlain by unconsolidated sediments of sand, silt, and clay. Rounded quartz gravel is in the soil in places. The elevation of the unit commonly ranges from sea level to about 300 feet above sea level.

This unit makes up about 11 percent of the survey area. The unit is about 20 percent Dumfries soils, 15 percent Lunt soils, 5 percent Marr soils, and 60 percent soils of minor extent.

The Dumfries soils are on strongly sloping to very steep side slopes. They are well drained and very deep and have a loamy subsoil.

The Lunt soils are on gently sloping to moderately steep side slopes. They are well drained and very deep and have a clayey subsoil.

The Marr soils are strongly sloping to moderately steep. They are very deep and well drained and have a high content of fine sand and very fine sand.

The dominant minor soils are Featherstone soils at low elevations that are inundated by extreme high tides; Marumsco soils that are on low, nearly level terraces and have a high content of clay; Neabsco soils that are at higher elevations and have a fragipan in the subsoil; very deep, well drained, clayey Quantico soils at higher elevations; and moderately well drained to poorly drained Codorus and Hatboro soils on flood plains.

This unit is dominantly a forest of mixed hardwoods and pines. A few areas are used for general farm crops, and some of the acreage is used for residential or industrial development.

Slow permeability, high content of clay, slope, and wetness are the main limitations of the unit.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Dumfries sandy loam, 7 to 15 percent slopes, is one of several phases in the Dumfries series.

Some map units are made up of two or more major soils. These map units are called soil complexes, soil associations, or undifferentiated groups.

A *soil complex* consists of two or more soils, or one or more soils and a miscellaneous area, in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Airmont-Weverton complex, 2 to 7 percent slopes, is an example.

A *soil association* is made up of two or more geographically associated soils that are shown as one unit on the maps. Because of present or anticipated soil uses in the survey area, it was not considered practical or necessary to map the soils separately. The pattern and relative proportion of the soils are somewhat similar.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in the mapped areas are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Urban land is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many terms used in describing the soils.

Soil Descriptions

1A—Aden silt loam, 0 to 2 percent slopes. This soil is very deep, nearly level, and poorly drained. It is on low stream terraces and is occasionally flooded. The

areas are irregularly rounded or oblong, and they range from about 2 to 20 acres. Slopes range from slightly convex to slightly concave.

Typically, the surface layer is light yellowish brown silt loam about 8 inches thick. The subsoil is about 50 inches thick. It is light gray silty clay loam in the upper part, strong brown clay in the middle part, and reddish brown silty clay loam in the lower part. The substratum is mottled pinkish gray, yellowish red, and yellowish brown silt loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Dulles and Readville soils. Also included are small areas with sandy loam in the subsoil. A few areas have a surface layer of gravelly silt loam. A few small areas in depressions are ponded for short periods after heavy rains. Included soils make up about 15 percent of this unit.

Major soil properties—

Permeability: Surface layer—moderate; subsoil—slow; substratum—moderate
Available water capacity: Moderate
Surface runoff: Slow
Erosion hazard: Slight
Organic matter content: Low
Natural fertility: Low to medium
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: 6 to 20 inches, restricted by wetness
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to the seasonal high water table: Surface to 12 inches, perched
Flooding: Occasional

Most of the acreage of this soil is woodland. The rest is in pasture.

This soil is poorly suited to cultivated crops and small grains. It is very poorly suited to alfalfa. The main limitations are wetness and occasional flooding in spring, fall, and winter. Artificial drainage is effective in some areas. Wetness interferes with cultivation and harvest operations in spring, winter, and fall.

This soil is suited only to wetness-tolerant grasses and legumes, mainly Kentucky-31 fescue, ladino clover, and other similar species. The main pasture management practices are weed control, use of lime and fertilizer, and controlled grazing.

The potential productivity for sweetgum on this soil is high. The estimated average annual production of wood per acre is 450 board-feet. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed. The main limitation for harvesting is wetness. The soil is soft when wet and does not support heavy equipment. In some areas wetness can be overcome by planting wet-tolerant species and harvesting during dry seasons.

This soil generally is not suited to building site development or onsite waste disposal. The heaving of road surfaces, caused by frost action in the winter, and insufficient strength and stability to support vehicular traffic are limitations that can be overcome by strengthening or replacing the base material. The slow permeability in the subsoil and the high water table are limitations for septic tank absorption fields, sanitary landfills, and building sites. These limitations are generally difficult to overcome.

The land capability classification is IIIw.

2B—Airmont-Weverton complex, 2 to 7 percent slopes. These soils are gently sloping and are on ridgecrests of Bull Run Mountain. The areas are generally convex and oblong and conform to the irregular contour of the landscape. They range from 2 to 100 acres. Drainageways cross some areas. The Airmont and Weverton soils are so intermingled or the areas of each are so small that it was not practical to map them separately. This unit is about 40 percent very deep and moderately well drained Airmont soils, 40 percent deep and well drained Weverton soils, and 20 percent other soils.

Typically, the surface layer of the Airmont soils is dark grayish brown very flaggy loam 1 inch thick. The subsurface layer is light yellowish brown very flaggy loam 10 inches thick. The subsoil is strong brown very flaggy clay loam 16 inches thick. Below that is a hard, dense layer, called a fragipan, that is 18 inches thick. It is brownish yellow very flaggy loam. The substratum is brownish yellow, mottled extremely flaggy clay loam to a depth of 60 inches or more.

Typically, the surface layer of the Weverton soils is brown to dark brown very flaggy loam 2 inches thick. The subsurface layer is brown very flaggy loam 5 inches thick. The subsoil is 45 inches thick. It is yellowish red very flaggy loam in the upper part, yellowish red very flaggy sandy clay loam in the middle part, and variegated reddish yellow and red extremely flaggy sandy clay loam in the lower part. The substratum is partially weathered quartzite mica schist 12 inches thick. Bedrock is at a depth of 64 inches.

Included with this complex in mapping are areas, generally less that 2 acres each, of Braddock and Stumptown soils.

Major properties of the Airmont soils—

Permeability: Surface layer—moderately rapid; upper part of the subsoil—moderately rapid; fragipan—slow; substratum—moderate to moderately rapid
Available water capacity: Very low
Surface runoff: Medium
Erosion hazard: Moderate
Organic matter content: Low or moderate
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: 20 to 40 inches, restricted by wetness
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to the seasonal high water table: 18 to 36 inches, perched
Flooding: None

Major properties of the Weverton soils—

Permeability: Surface layer—moderately rapid; subsoil—moderate; substratum—moderate
Available water capacity: Very low
Surface runoff: Medium
Erosion hazard: Moderate
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: 40 to 60 inches, restricted by rock
Depth to bedrock. 40 to 80 inches, soft
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are woodland; a few areas are used for pasture.

This unit is poorly suited to cultivated crops and alfalfa. The main limitations are flagstones on the surface and droughtiness. Good seedbed preparation is difficult because of flagginess.

This unit is poorly suited to grasses and legumes. The main limitations are the flagstones on the surface and droughtiness. If the soil is used for pasture, the main management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, and ladino clover are the suited species.

The potential productivity for northern red oak on these soils is moderately high. The estimated average annual production of wood per acre is 280 board-feet. Trees, seeds, cuttings, and seedlings survive and grow if competing vegetation is controlled or removed. There are few hazards or limitations for planting and harvesting.

This unit is poorly suited to building site development and onsite waste disposal. The slow permeability and seasonal high water table in the Airmont soil are limitations for septic tank absorption fields. The seasonal high water table in the Airmont soil is a limitation for dwellings. Some of these limitations can be overcome by using drainage. The large amount of stones in the Weverton soils is a major limitation.

The land capability classification is VIs.

2C—Airmont-Weverton complex, 7 to 15 percent slopes. These soils are strongly sloping and are on ridgecrests and side slopes of Bull Run Mountain. The areas are generally convex and oblong and conform to the irregular contour of the landscape. They range from 2 to 100 acres. Drainageways cross some areas. The Airmont and Weverton soils are so closely associated and so intermingled or the areas of each are so small that it was not practical to map them separately. This unit is about 40 percent very deep and moderately well drained Airmont soils, 40 percent deep and well drained Weverton soils, and 20 percent other soils.

Typically, the surface layer of the Airmont soils is dark grayish brown very flaggy loam 1 inch thick. The subsurface layer is light yellowish brown very flaggy loam 10 inches thick. The subsoil is strong brown very flaggy clay loam 16 inches thick. Below that is a hard, dense layer, called a fragipan, that is 18 inches thick. It is brownish yellow very flaggy loam. The substratum is brownish yellow, mottled extremely flaggy clay loam to a depth of 60 inches or more.

Typically, the surface layer of the Weverton soils is brown to dark brown very flaggy loam 2 inches thick. The subsurface layer is brown very flaggy loam 5 inches thick. The subsoil is 45 inches thick. It is yellowish red very flaggy loam in the upper part, yellowish red very flaggy sandy clay loam in the middle part, and variegated reddish yellow and red extremely flaggy sandy clay loam in the lower part. The substratum is partially weathered quartzite mica schist 12 inches thick. Bedrock is at a depth of 64 inches.

Included with this complex in mapping are areas, generally less than 2 acres each, of Braddock and Stumptown soils.

Major properties of the Airmont soils—

Permeability: Surface layer—moderately rapid; upper part of the subsoil—moderately rapid; fragipan—slow; substratum—moderate to moderately rapid
Available water capacity: Very low
Surface runoff: Medium
Erosion hazard: Severe
Organic matter content: Low or moderate
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: 20 to 40 inches, restricted by wetness
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to the seasonal high water table: 18 to 36 inches, perched
Flooding: None

Major properties of the Weverton soils—

Permeability: Surface layer—moderately rapid; subsoil—moderate; substratum—moderate
Available water capacity: Very low
Surface runoff: Medium
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: 40 to 60 inches, restricted by rock
Depth to bedrock: 40 to 80 inches, soft
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are woodland; a few areas are used for pasture.

This unit s poorly suited to cultivated crops and alfalfa. The main limitations are flagstones on the surface and drought ness. Good seedbed preparation is difficult because of flagginess.

This unit is poorly suited to grasses and legumes. The main limitations are the flagstones on the surface and droughtiness. If the soil is used for pasture, the main management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, and ladino clover are the suited species.

The potential productivity for northern red oak on these soils is moderately high. The estimated average annual production of wood per acre is 280 board-feet. Trees, seeds, cuttings, and seedlings survive and grow if competing vegetation is controlled or removed. There are few hazards or limitations for planting and harvesting.

This unit is poorly suited to building site development and onsite waste disposal. The slow permeability and seasonal high water table in the Airmont soil are limitations for septic tank absorption fields. The seasonal high water table in the Airmont soil is a limitation for dwellings. Some of these limitations can be overcome by using drainage. The large amount of stones in the Weverton soil is a major limitation.

The land capability classification is VIs.

2D—Airmont-Weverton complex, 15 to 25 percent slopes. These soils are moderately steep and are on side slopes of Bull Run Mountain. The areas are generally convex and oblong and conform to the irregular contour of the landscape. They range from 2 to 100 acres. Drainageways cross some areas. The Airmont and Weverton soils are so closely associated and so intermingled or the areas of each are so small that it was not practical to map them separately. This unit is about 40 percent very deep and moderately well drained Airmont soils, 40 percent deep and well drained Weverton soils, and 20 percent other soils.

Typically, the surface layer of the Airmont soils is dark grayish brown very flaggy loam 1 inch thick. The subsurface layer is light yellowish brown very flaggy loam 10 inches thick. The subsoil is strong brown very flaggy clay loam 16 inches thick. Below that is a hard, dense layer, called a fragipan, that is 18 inches thick. It is brownish ye low very flaggy loam. The substratum is brownish yellow, mottled extremely flaggy clay loam to a depth of 60 inches or more.

Typically, the surface layer of the Weverton soils is brown to dark brown very flaggy loam 2 inches thick. The subsurface layer is brown very flaggy loam 5 inches thick. The subsoil is 45 inches thick. It is yellowish red very flaggy loam in the upper part, yellowish red very flaggy sandy clay loam in the middle part, and variegated reddish yellow and red extremely flaggy sandy clay loam in the lower part. The substratum is partially weathered quartzite mica schist 12 inches thick. Bedrock is at a depth of 64 inches.

Included with this complex in mapping are areas, generally less than 2 acres each, of Braddock and Stumptown soils.

Major properties of the Airmont soils—

Permeability: Surface layer—moderately rapid; upper

part of the subsoil—moderately rapid; fragipan—slow; substratum—moderate to moderately rapid
Available water capacity: Very low
Surface runoff: Rapid
Erosion hazard: Severe
Organic matter content: Low or moderate
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: 20 to 40 inches, restricted by wetness
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to the seasonal high water table: 18 to 36 inches, perched
Flooding: None

Major properties of the Weverton soils—

Permeability: Surface layer—moderately rapid; subsoil—moderate; substratum—moderate
Available water capacity: Very low
Surface runoff: Rapid
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: 40 to 60 inches, restricted by rock
Depth to bedrock: 40 to 80 inches, soft
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are woodland; a few areas are used for pasture.

This unit is poorly suited to cultivated crops and alfalfa. The main limitations are flagstones on the surface, slope, and droughtiness.

This unit is poorly suited to grasses and legumes. The main limitations are the flagstones on the surface and droughtiness. If the soil is used for pasture, the main management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, and ladino clover are the suited species.

The potential productivity for northern red oak on these soils is moderately high on north-facing slopes and moderate on south-facing slopes. The estimated average annual production of wood per acre is 280 board-feet on north-facing slopes and 250 board-feet on south-facing slopes. Trees, seeds, cuttings, and seedlings survive and grow if competing vegetation is controlled or removed, but mortality is high on the south-facing slopes because of droughtiness. Slope limits planting and harvesting, and erosion is a hazard if skid trails are up and down the slope instead of on the contour.

This unit is poorly suited to building site development and onsite waste disposal. The slow permeability and seasonal high water table in the Airmont soil are limitations for septic tank absorption fields. The seasonal high water table in the Airmont soil is a limitation for dwellings. Some of these limitations can be overcome by using drainage. The large amount of stones in the Weverton soil is a major limitation.

The land capability classification is VIs.

2E—Airmont-Weverton complex, 25 to 50 percent slopes. These soils are steep and very steep. They are on side slopes of Bull Run Mountain. The areas are generally convex and oblong and conform to the irregular contour of the landscape. They range from 2 to 200 acres. Drainageways cross some areas. The Airmont and Weverton soils are so closely associated and so intermingled or the areas of each are so small that it was not practical to map them separately. This unit is about 40 percent very deep and moderately well drained Airmont soils, 40 percent deep and well drained Weverton soils, and 20 percent other soils.

Typically, the surface layer of the Airmont soils is dark grayish brown very flaggy loam 1 inch thick. The subsurface layer is light yellowish brown very flaggy loam 10 inches thick. The subsoil is strong brown very flaggy clay loam 16 inches thick. Below that is a hard, dense layer, called a fragipan, that is 18 inches thick. It is brownish yellow very flaggy loam. The substratum is brownish yellow, mottled extremely flaggy clay loam to a depth of 60 inches or more.

Typically, the surface layer of the Weverton soils is brown to dark brown very flaggy loam 2 inches thick. The subsurface layer is brown very flaggy loam 5 inches thick. The subsoil is 45 inches thick. It is yellowish red very flaggy loam in the upper part, yellowish red very flaggy sandy clay loam in the middle part, and variegated reddish yellow and red extremely flaggy sandy clay loam in the lower part. The substratum is partially weathered quartzite mica schist 12 inches thick. Bedrock is at a depth of 64 inches.

Included with this complex in mapping are areas, generally less than 2 acres each, of Braddock and Stumptown soils.

Major properties of the Airmont soils—

Permeability: Surface layer—moderately rapid; upper part of the subsoil—moderately rapid; fragipan—slow; substratum—moderate to moderately rapid
Available water capacity: Very low
Surface runoff: Rapid
Erosion hazard: Severe
Organic matter content: Low or moderate
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: 20 to 40 inches, restricted by wetness
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to the seasonal high water table: 18 to 36 inches, perched
Flooding: None

Major properties of the Weverton soils—

Permeability: Surface layer—moderately rapid; subsoil—moderate; substratum—moderate
Available water capacity: Very low
Surface runoff: Rapid
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: 40 to 60 inches, restricted by rock
Depth to bedrock: 40 to 80 inches, soft
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are woodland; a few areas are used for pasture.

This unit is poorly suited to cultivated crops and alfalfa. The main limitations are the flagstones on the surface, slope, and droughtiness.

This unit is poorly suited to grasses and legumes. The main limitations are the flagstones on the surface and droughtiness. If the soil is used for pasture, the main management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, and ladino clover are the suited species.

The potential productivity for northern red oak on these soils is moderately high. The estimated average annual production of wood per acre is 280 board-feet on north-facing slopes and 250 board-feet on south-facing slopes. Trees, seeds, cuttings, and seedlings survive and grow if competing vegetation is controlled or removed, but mortality is high on the south-facing slopes because of droughtiness. Slope limits planting and harvesting.

This unit is poorly suited to building site development and onsite waste disposal. The slow permeability and seasonal high water table in the Airmont soil and the slope of the unit are limitations for septic tank absorption fields. The seasonal high water table in the Airmont soil and the slope of the unit are limitations for dwellings. Some of these limitations can be overcome by using drainage and grading. The large amount of stones in the Weverton soil is a major limitation.

The land capability classification is VIIs.

3A—Albano silt loam, 0 to 4 percent slopes. This soil is deep, level to gently sloping, and poorly drained. It is on upland flats and in depressions. Slopes are generally concave but range to slightly convex. The areas are irregularly rounded to oblong and range from approximately 2 to 100 acres.

Typically, the surface layer is very dark grayish brown silt loam 2 inches thick. The subsurface layer is light brownish gray silt loam 5 inches thick. The subsoil is about 33 inches thick. The upper part of the subsoil is light gray silty clay loam, the middle part is gray clay, and the lower part is very dark gray clay. The substratum is 3 inches thick. It is partially weathered, reddish brown siltstone with gray clay in crevices. Bedrock is at a depth of 43 inches.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Arcola, Calverton, Dulles, Panorama, and Reaville soils. Included soils make up about 20 percent of this map unit.

Major soil properties—

Permeability: Surface layer—moderate; subsoil—slow; substratum—slow to moderately slow
Available water capacity: Moderate
Surface runoff: Slow
Erosion hazard: Moderate
Organic matter content: Low
Natural fertility: Medium
Soil reaction: Surface layer—very strongly acid to moderately acid; subsoil and substratum—moderately acid to neutral
Depth of the root zone: 10 to 30 inches, restricted by wetness
Depth to bedrock: 40 to 60 inches, hard

Shrink-swell potential: Moderate
Depth to the seasonal high water table: Surface to 18 inches, apparent
Flooding: None

Most areas of tnis soil are woodland. A few areas are in pasture.

This soil is poorly suited to cultivated crops, small grains, and alfalfa. The main limitation is wetness in spring, fall, and winter. Artificial drainage is needed for row crops. With artificial drainage, this soil is suited to corn, soybeans, and small grains.

This soil is moderately well suited to wetness-tolerant grasses and legumes, mainly Kentucky-31 fescue, ladino clover, and similar species. The main management practices are artificial drainage, use of lime and fertilizer, weed control, and controlled grazing.

The potential productivity for northern red oak on this soil is moderate. The estimated average annual production of wood per acre is 250 board-feet. Tree seeds, cuttings, and seedlings have a high rate of mortality because of wetness. Planting trees that tolerate wetness helps to overcome this limitation. The major limitation for planting and harvesting is wetness.

This soil is very poorly suited to building site development and onsite waste disposal. The seasonal high water table and low strength limit this soil for building site development. The seasonal high water table limits the soil for onsite waste disposal. The wetness can be overcome in some areas if water-disposal areas can be located for subsurface drainage.

The land capability classification is Vw.

4B—Arcola silt loam, 2 to 7 percent slopes. This soil is moderately deep, gently sloping, and well drained. It is on ridgecrests and side slopes. Slopes are commonly convex but range to concave in a few places. The areas are long and narrow to irregularly rounded and conform to the contour of the landscape. Shallow drainageways are common. The areas of the soil range from approximately 2 to 50 acres.

Typically, the surface layer is reddish brown silt loam 9 inches thick. The subsoil is reddish brown gravelly silt loam 13 inches thick. The substratum is reddish brown very gravelly silt loam 6 inches thick. Bedrock is at a depth of 28 inches.

Included with this soil in mapping are small areas of Albano, Calverton, Manassas, Nestoria, Panorama, and Reavi le soils. A few areas have little or no subsoil and are shallower to rock. In a few places the substratum is at a depth of 60 inches or more. Inclusions make up approximately 20 percent of this map unit.

Major soil properties—

Permeability: Moderate throughout
Available water capacity: Low
Surface runoff: Medium
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low to medium
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: 20 to 40 inches, restricted by rock
Depth to bedrock: 20 to 40 inches, soft
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most of the acreage of this soil is woodland. The rest is in cultivated crops and pasture or hay. This soil is classified as prime farmland.

This soil is moderately well suited to cultivated crops and small grains. The main limitations are droughtiness and the erosion hazard. Crops respond to applications of lime and fertilizer. Cover crops, conservation tillage, and crop residue in and on the soil help conserve moisture and control erosion.

This soil is well suited to grasses and legumes. The main pasture management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, ladino clover, and alfalfa are suitable species.

The potential productivity for northern red oak on this soil is moderate. The estimated average annual production of wood per acre is 275 board-feet. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed. There are few or no hazards or limitations for planting or harvesting trees.

This soil is suitable for most types of building site development. The depth to bedrock and seepage are limitations for septic tank absorption fields and sanitary landfills. The heaving of road surfaces after freezing in the winter is a limitation that can be overcome by replacing the base material.

The land capability classification is IIe.

5C—Arcola-Nestoria complex, 7 to 15 percent slopes. These soils are strongly sloping and are on side slopes. Slopes are commonly convex, but some small areas are concave. The areas of these soils are irregularly rounded to long and narrow and range from about 2 to 50 acres. The Arcola and Nestoria soils are

so closely associated and intricately mixed that they could not be mapped separately. This complex is about 50 percent moderately deep and well drained Arcola soils, 30 percent shallow and somewhat excessively drained Nestoria soils, and 20 percent other soils.

Typically, the surface layer of the Arcola soils is reddish brown silt loam 9 inches thick. The subsoil is reddish brown gravelly silt loam 13 inches thick. The substratum is reddish brown very gravelly silt loam 6 inches thick. Bedrock is at a depth of 28 inches.

Typically, the surface layer of the Nestoria soils is reddish brown gravelly silt loam about 8 inches thick. The subsoil is reddish brown very gravelly silt loam 6 inches thick. The substratum is 16 inches thick. The upper part of the substratum is reddish brown very gravelly silt loam, and the lower part is red siltstone and fine grained sandstone. Bedrock is at a depth of 30 inches.

Included with this unit in mapping are areas, generally less than 2 acres each, of Albano, Dulles, Manassas, Panorama, and Reaville soils. Also included are small areas with little or no subsoil. In places the substratum is at a depth of 60 inches or more, or the surface layer is very channery silt loam, or the soil has a few shallow gullies and small eroded spots.

Major properties of the Arcola soils—

Permeability: Moderate throughout
Available water capacity: Low
Surface runoff: Rapid
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low to medium
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: 20 to 40 inches, restricted by rock
Depth to bedrock: 20 to 40 inches, soft
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Major properties of the Nestoria soils—

Permeability: Moderate throughout
Available water capacity: Very low
Surface runoff: Rapid
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid to moderately acid
Depth of the root zone: 10 to 20 inches, restricted by rock
Depth to bedrock: 10 to 20 inches, soft
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most areas of these soils are in hay and pasture. A few areas are woodland, and a few are used for cultivated crops.

The Arcola soils are moderately well suited to cultivated crops and small grains, and the Nestoria soils are poorly suited. The main limitations are droughtiness, erosion, and slope. Where cultivated crops are grown, conservation tillage and a long rotation with grasses and legumes are needed.

The Arcola soils are well suited to grasses and legumes, and the Nestoria soils are poorly suited. The main limitation is droughtiness in the Nestoria soils. The main pasture management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, ladino clover, and alfalfa are suitable species.

The potential productivity for northern red oak on these soils is moderate. The estimated average annual production of wood per acre is 275 board-feet. Tree seeds, cuttings, and seedlings survive and grow well on the Arcola soils if competing vegetation is controlled or removed. On the Nestoria soils, however, the mortality rate is high because of droughtiness. There are few or no hazards or limitations for harvesting trees on these soils.

The Arcola soils are suitable for most types of building site development. The depth to bedrock and seepage are limitations for septic tank absorption fields. The depth to bedrock limits deep excavations and grading; however, the underlying siltstone and sandstone is commonly rippable to a depth of several feet in many areas.

The land capability classification is IVe.

5D—Arcola-Nestoria complex, 15 to 25 percent slopes. These soils are moderately steep and are on side slopes. Slopes are commonly convex but, some small areas are concave. The areas of these soils are irregularly rounded to long and narrow and range from about 2 to 50 acres. The Arcola and Nestoria soils are so closely associated and intricately mixed that they could not be mapped separately. This complex is about

50 percent moderately deep and well drained Arcola soils, 30 percent shallow and somewhat excessively drained Nestoria soils, and 20 percent other soils.

Typically, the surface layer of the Arcola soils is reddish brown silt loam 9 inches thick. The subsoil is reddish brown gravelly silt loam 13 inches thick. The substratum is reddish brown very gravelly silt loam 6 inches thick. Bedrock is at a depth of 28 inches.

Typically, the surface layer of the Nestoria soils is reddish brown gravelly silt loam about 8 inches thick. The subsoil is reddish brown very gravelly silt loam 6 inches thick. The substratum is 16 inches thick. The upper part of the substratum is reddish brown very gravelly silt loam, and the lower part is red siltstone and fine grained sandstone. Bedrock is at a depth of 30 inches.

Included with this unit in mapping are areas, generally less than 2 acres each, of Albano, Dulles, Manassas, Panorama, and Reaville soils. Also included are small areas with little or no subsoil. In places the substratum is at a depth of 60 inches or more, or the surface layer is very channery silt loam, or the soil has a few shallow gullies and small eroded spots.

Major properties of the Arcola soils—

Permeability: Moderate throughout
Available water capacity: Low
Surface runoff: Very rapid
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low to medium
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: 20 to 40 inches, restricted by rock
Depth to bedrock: 20 to 40 inches, soft
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Major properties of the Nestoria soils—

Permeability: Moderate throughout
Available water capacity: Very low
Surface runoff: Very rapid
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid to moderately acid
Depth of the root zone: 10 to 20 inches, restricted by rock
Depth to bedrock: 10 to 20 inches, soft
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most areas of these soils are woodland. A few areas are used for hay and pasture.

The Arcola soils are poorly suited to grasses and legumes, and the Nestoria soils are very poorly suited. The main limitation is droughtiness in the Nestoria soils and the slope of the unit. The main pasture management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, ladino clover, and alfalfa are common species.

The potential productivity for northern red oak on these soils is moderate. The estimated average annual production of wood per acre is 275 board-feet. Tree seeds, cuttings, and seedlings survive and grow well on the Arcola soils if competing vegetation is controlled or removed. On the Nestoria soils, however, the mortality rate is high because of droughtiness, especially on the south-facing slopes. Slope limits harvesting of trees on these soils, and erosion is a hazard if skid trails are up and down the slope instead of on the contour.

These soils are very poorly suited to most types of building site development and onsite waste disposal.

The land capability classification is IVe.

6A—Baile loam, 0 to 4 percent slopes. This soil is very deep, level to gently sloping, and poorly drained. It is in depressional areas, on toe slopes, and along drainageways. Slopes are commonly concave but range to slightly convex. The areas are commonly long and narrow and range from 2 to 20 acres.

Typically, the surface layer is very dark grayish brown loam 2 inches thick. The subsurface is grayish brown loam 8 inches thick. The subsoil layer is about 37 inches thick. The upper part of the subsoil is light gray clay loam, the middle part is light gray sandy clay loam, and the lower part is white sandy clay loam. The substratum is dominantly white, mottled sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Buckhall, Elioak, and Glenville soils. Also included are a few areas with a subsoil of clay or a surface layer of gravelly loam. In some areas gravel lines are common in the lower part of the subsoil. A few areas near Bull Run Mountain have a surface layer of cobbly loam. Included soils make up about 25 percent of this map unit.

Major soil properties—

Permeability: Surface layer—moderately slow; subsoil—slow; substratum—slow to moderately slow
Available water capacity: High
Surface runoff: Slow
Erosion hazard: Moderate
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth of the root zone: 10 to 30 inches, restricted by wetness
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to the seasonal high water table: Surface to 6 inches, apparent
Flooding: None

Most areas of this soil are woodland. Some of the acreage is farmed and in pasture.

This soil is poorly suited to cultivated crops, small grains, and alfalfa. The main limitation is wetness in spring, fall, and winter. Artificial drainage is needed for row crops.

This soil is moderately well suited to grasses and legumes that tolerate wet conditions. The main pasture management practices are use of lime and fertilizers, some artificial drainage, weed control, and controlled grazing. Kentucky-31 fescue and similar species are suitable.

The potential productivity for pin oak on this soil is moderately high. The estimated average annual production of wood per acre is 400 board-feet. Tree seeds, cuttings, and seedlings have a high rate of mortality because of wetness. Planting trees that tolerate wetness helps to overcome this limitation. The major limitation for planting and harvesting is wetness. Harvesting in dry seasons helps prevent rutting of the skid trails.

This soil is very poorly suited to building site development and onsite waste disposal. The seasonal high water table and low strength limit building site development. The seasonal high water table limits the soil for onsite waste disposal. The wetness can be overcome in some areas if water disposal areas can be located for subsurface drainage.

The land capability classification is Vw.

7A—Bermudian silt loam, 0 to 2 percent slopes. This soil is very deep, level to nearly level, and well drained. It is on broad, low flood plains along the larger streams in the county, such as Bull Run, Broad Run, Cedar Run, Kettle Run, and Slate Run. The areas of this soil are commonly elongated and follow the course of the adjacent stream and range from 2 to 20 acres.

Typically, the surface layer is dark reddish brown silt loam 12 inches thick. The subsoil is dark reddish brown silt loam 26 inches thick. The substratum is dark reddish brown channery silty clay loam 24 inches thick. Bedrock is at a depth of 64 inches.

Included with this soil in mapping are small intermingled areas, generally less than 2 acres each, of Arcola, Calverton, Panorama, and Reaville soils. Also included are spots in old abandoned stream channels where the surface layer is very gravelly or cobbly silt loam. Included soils make up about 15 percent of the map unit.

Major soil properties—

Permeability: Surface layer—moderate to moderately rapid; subsoil—moderate to moderately rapid; substratum—rapid
Available water capacity: Moderate
Surface runoff: Low
Erosion hazard: Low
Organic matter content: Low
Natural fertility: Medium
Soil reaction: Very strongly acid to moderately acid
Depth of the root zone: 40 to 60 inches, restricted by wetness
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to the seasonal high water table: 36 to 60 inches, apparent
Flooding: Occasional

Most areas of this soil are farmed and are dominantly in hay and pasture. A few areas are in cultivated crops, and a few are woodland.

This soil is well suited to cultivated crops. The main management concerns are the need to increase organic matter content and the need for lime and fertilizer. If the soil is cultivated, conservation tillage, cover crops, and grasses and legumes in the cropping system increase organic matter content and maintain the tilth of the soil. Crop residue on or in the surface layer helps maintain tilth. Corn, soybeans, and small grains are suitable crops.

This soil is well suited to grasses and legumes. Establishing and maintaining stands of grasses and legumes and preventing overgrazing are major pasture management concerns. Use of proper stocking rates, rotation grazing, deferred grazing, and use of lime and fertilizer are the major pasture management practices. Orchardgrass, Kentucky-31 fescue, red clover, and

ladino clover are suitable species.

The potential productivity for northern red oak on this soil is moderately high. The estimated average annual production of wood per acre is 400 board-feet. The soil is managed mostly for hardwood. Tree seeds, cuttings, and seedlings survive and do well on this soil.

This soil is generally unsuited to building site development or onsite waste disposal. Flooding is the main limitation for building site development. Flooding and pollution of ground water are the main limitations for onsite waste disposal. Flood-control structures can overcome some of these limitations.

The land capability classification is I.

8C—Braddock loam, 7 to 15 percent slopes. This soil is very deep, strongly sloping, and well drained. It is on ridgecrests, side slopes, and foot slopes of Bull Run Mountain and the Triassic region of the Piedmont Plateau. Slopes are generally convex, but some small areas are concave. The areas of this soil commonly are oblong to irregularly rounded and range from approximately 2 to 40 acres.

Typically, the surface layer is strong brown loam 8 inches thick. The subsoil is red clay to a depth of 60 inches or more.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Airmont, Brentsville, Dulles, Legore, Montalto, and Sudley soils. Also included are small areas with a surface layer of severely eroded clay or clay loam and a few small areas with a surface layer of cobbly loam. Included soils make up about 20 percent of this map unit.

Major soil properties—

Permeability: Surface layer—moderate to moderately rapid; subsoil—moderate
Available water capacity: Moderate
Surface runoff: Medium
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most areas of this unit are woodland. A few areas are farmed.

This unit is moderately well suited to cultivated crops. The hazard of erosion is a major limitation. The soil responds well to lime and fertilizer. Cover crops, conservation tillage, and crop residue in and on the soil help conserve moisture and control erosion. Corn, soybeans, small grains, and alfalfa are suitable crops.

This soil is well suited to grasses and legumes. The main management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, ladino clover, and alfalfa are suited species.

The potential productivity for northern red oak on this soil is moderately high. The estimated average annual production of wood per acre is 300 board-feet. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed.

This soil is suitable for building site development and onsite waste disposal. It does not have sufficient strength or stability to support vehicular traffic, but this limitation can be overcome by strengthening or replacing the base material. The permeability rate is a limitation for septic tank absorption fields, but increasing the absorption area helps to overcome the permeability. Sealing the bottom of sewage lagoons helps prevent seepage.

The land capability classification is IIIe.

9B—Brentsville sandy loam, 2 to 7 percent slopes. This soil is moderately deep, gently sloping, and well drained. It is on ridgecrests and side slopes. The areas of this soil are irregularly rounded to long and narrow and conform to the irregular contour of the landscape. Shallow drainageways cross the areas at common intervals. Slopes are commonly convex but range to slightly concave. The areas range from about 2 to 50 acres.

Typically, the surface layer of this soil is dark reddish brown sandy loam 2 inches thick. The subsurface layer is reddish brown sandy loam 9 inches thick. The subsoil is reddish brown sandy loam 15 inches thick. The substratum is 12 inches thick. The upper part of the substratum is dusky red sandy loam, and the lower part is dusky red, soft, partially weathered sandstone. Bedrock is at a depth of 38 inches.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Albano, Arcola, Calverton, Dulles, Manassas, Nestoria, and Panorama soils. Inclusions make up approximately 20 percent of this map unit.

Major soil properties—

Permeability: Moderate throughout
Available water capacity: Low
Surface runoff: Medium
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low to medium
Soil reaction: Extremely acid to very strongly acid
Depth of the root zone: 20 to 40 inches, restricted by bedrock
Depth to bedrock: 20 to 40 inches, hard
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most of the acreage of this soil is woodland. The rest is used for cultivated crops, hay, and pasture.

This soil is suited to cultivated crops. The main limitations are droughtiness, the erosion hazard, and slope. Cover crops and grasses and legumes, conservation tillage, contour farming, and crop residue in and on the soil help conserve moisture and control erosion. Corn, soybeans, wheat, and oats are suitable species.

This soil is well suited to grasses and moderately well suited to legumes. Droughtiness is the main limitation. The main pasture management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, ladino clover, and alfalfa are suitable species.

The potential productivity for northern red oak on this soil is moderately high. The estimated average annual production of wood per acre is 275 board-feet. Tree seeds, cuttings, and seedlings in dry seasons have a high mortality rate because of droughtiness.

This soil is suitable for building site development and onsite waste disposal. The heaving of road surfaces, caused by frost action in the winter, is a limitation that can be overcome by replacing the base material. Sealing sewage lagoons helps prevent seepage. The depth to bedrock in places can be overcome by adding fill material.

The land capability classification is IIe.

9C—Brentsville sandy loam, 7 to 15 percent slopes. This soil is moderately deep, strongly sloping, and well drained. It is on ridgecrests and side slopes. The areas of this soil are irregularly rounded to long and narrow and conform to the irregular contour of the landscape. Shallow drainageways cross the areas at common intervals. Slopes are commonly convex but range to slightly concave. The areas range from about 2 to 50 acres.

Typically, the surface layer of this soil is dark reddish brown sandy loam 2 inches thick. The subsurface layer is reddish brown sandy loam 9 inches thick. The subsoil is reddish brown sandy loam 15 inches thick. The substratum is 12 inches thick. The upper part of the substratum is dusky red sandy loam, and the lower part is dusky red, soft, partially weathered sandstone. Bedrock is at a depth of 38 inches.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Albano, Arcola, Calverton, Dulles, Manassas, Nestoria, and Panorama soils. Inclusions make up approximately 20 percent of this map unit.

Major soil properties—

Permeability: Moderate throughout
Available water capacity: Low
Surface runoff: Medium
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low to medium
Soil reaction: Extremely acid to very strongly acid
Depth of the root zone: 20 to 40 inches, restricted by bedrock
Depth to bedrock: 20 to 40 inches, hard
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most of the acreage of this soil is woodland. The rest is used for cultivated crops, hay, and pasture.

This soil is moderately well suited to cultivated crops. The main limitations are droughtiness, the erosion hazard, and slope. Cover crops and grasses and legumes, conservation tillage, contour farming, and crop residue in and on the soil help conserve moisture and control erosion. Corn, soybeans, wheat, and oats are suitable species.

This soil is suited to grasses and moderately well suited to legumes. Droughtiness is the main limitation. The main pasture management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, ladino clover, and alfalfa are suitable species.

The potential productivity for northern red oak on this soil is moderate. The estimated average annual production of wood per acre is 275 board-feet. Tree

seeds, cuttings, and seedlings in dry seasons have a high mortality rate because of droughtiness.

This soil is suitable for building site development and onsite waste disposal. The heaving of road surfaces, caused by frost action in the winter, is a limitation that can be overcome by replacing the base material. Sealing sewage lagoons helps prevent seepage. The depth to bedrock in places can be overcome by adding fill material.

The land capability classification is IIIe.

10B—Buckhall loam, 2 to 7 percent slopes. This soil is very deep, gently sloping, and well drained. It is on narrow to medium-wide ridgetops. Slopes are generally convex, but shallow swales cross the areas at common intervals. The areas range from about 2 to 30 acres.

Typically, the surface layer is dark grayish brown loam 1 inch thick. The subsurface layer is light yellow sh brown loam 6 inches thick. The subsoil is 36 inches thick. It is brownish yellow clay loam in the upper part and strong brown clay in the lower part. The substratum extends to a depth of 72 inches or more. It is reddish yellow, strongly weathered granite gneiss that crushes to sandy loam.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Fairfax, Hoadly, Meadowville, and Occoquan soils. Included soils make up about 20 percent of this unit.

Major soil properties—

Permeability: Surface layer—moderately rapid; subsoil—moderate; substratum—moderate
Available water capacity: Moderate
Surface runoff: Medium
Erosion hazard: Moderate
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most of the acreage of this soil is woodland. The rest is used for cultivated crops, hay, and pasture.

This soil is well suited to cultivated crops. The main limitations are the erosion hazard and slope. Good seedbed preparations are difficult on the severely eroded inclusions. Cover crops and grasses and legumes in the rotation, conservation tillage, and crop residue in and on the soil help conserve moisture and control erosion. Corn, soybeans, wheat, and oats are common crops.

This soil is well suited to grasses and legumes. The main pasture management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, ladino clover, and alfalfa are suited species.

The potential productivity for northern red oak on this soil is moderately high. The estimated average annual production of wood per acre is 300 board-feet. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed.

This soil is suitable for building site development and onsite waste disposal. It does not have sufficient strength and stability to support vehicular traffic, but in places this limitation can be corrected by strengthening or replacing the base material. The permeability is a limitation for septic tank absorption fields but can be overcome in places by increasing the absorption area. Sealing sewage lagoons helps to prevent seepage. The high clay content makes this soil difficult to spread on landfills, because it becomes sticky when wet. Mixing or replacing the clayey material with a soil with less clay helps to overcome this limitation in some areas.

The land capability classification is IIe.

10C—Buckhall loam, 7 to 15 percent slopes. This soil is very deep, strongly sloping, and well drained. It is on narrow to medium-wide ridgetops and side slopes. Slopes are generally convex, but shallow swales cross the areas at common intervals. The areas range from about 2 to 30 acres.

Typically, the surface layer is dark grayish brown loam 1 inch thick. The subsurface layer is light yellowish brown loam 6 inches thick. The subsoil is 36 inches thick. It is brownish yellow clay loam in the upper part and strong brown clay in the lower part. The substratum extends to a depth of 72 inches or more. It is reddish yellow, strongly weathered granite gneiss that crushes to sandy loam.

Included with this soil in mapping are areas, generally less than 2 acres each, of Fairfax, Hoadly, Meadowville, and Occoquan soils. Included soils make up about 20 percent of this unit.

Major soil properties—

Permeability: Surface layer—moderately rapid; subsoil—moderate; substratum—moderate

Available water capacity: Moderate
Surface runoff: Medium to rapid
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most of the acreage of this soil is woodland. The rest is used for cultivated crops, hay, and pasture.

This soil is moderately well suited to cultivated crops. The main limitations are the erosion hazard and slope. Good seedbed preparations are difficult on the severely eroded inclusions. Cover crops and grasses and legumes in the rotation, conservation tillage, and crop residue in and on the soil help conserve moisture and control erosion. Corn, soybeans, wheat, and oats are common crops.

This soil is well suited to grasses and legumes. The main pasture management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, ladino clover, and alfalfa are suited species.

The potential productivity for northern red oak on this soil is moderately high. The estimated average annual production of wood per acre is 300 board-feet. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed.

This soil is suitable for building site development and onsite waste disposal. It does not have sufficient strength and stability to support vehicular traffic, but in places this limitation can be corrected by strengthening or replacing the base material. The permeability is a limitation for septic tank absorption fields but can be overcome in places by increasing the the absorption area. Sealing sewage lagoons helps to prevent seepage. The high clay content makes this soil difficult to spread on landfills, because it becomes sticky when wet. Mixing or replacing the clayey material with a soil with less clay helps to overcome this limitation in some areas.

The land capability classification is IIIe.

11B—Calverton silt loam, 0 to 7 percent slopes. This soil is deep, nearly level to gently sloping, and moderately well drained to somewhat poorly drained. It is on generally broad ridgecrests. The areas are narrow to irregularly rounded and conform to the irregular contour of the landscape. Slopes are convex but range to concave. The areas range from about 2 to 20 acres.

Typically, the surface layer is dark grayish brown silt loam 2 inches thick. The subsurface layer is very pale brown silt loam 8 inches thick. The upper part of the subsoil is mottled, brownish yellow silty clay loam 9 inches thick. The middle part of the subsoil is a hard, dense layer, called a fragipan, that is brownish yellow silt loam 10 inches thick. The lower part of the subsoil is red silty clay 26 inches thick. The substratum is red weathered siltstone to a depth of 60 inches or more.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Arcola, Manassas, Panorama, and Reaville soils. Also included are small areas with a surface layer of gravelly silt loam. Inclusions make up approximately 20 percent of this map unit.

Major soil properties—

Permeability: Surface layer—moderate; upper part of the subsoil—moderately slow to moderate; fragipan—very slow or slow; substratum—very slow to moderate
Available water capacity: Low
Surface runoff: Medium
Erosion hazard: Moderate
Organic matter content: Low
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth of the root zone: 10 to 30 inches, restricted by fragipan and wetness
Depth to bedrock: 40 to 60 inches, soft
Shrink-swell potential: Moderate
Depth to the seasonal high water table: 12 to 24 inches, perched
Flooding: None

Most of the acreage of this soil is in cropland or pasture. The rest is woodland.

This soil has fair suitability for cultivated crops. The seasonal high water table, general wetness, shallow rooting depth, and low fertility level are the main limitations. Wetness often interferes with cultivation and harvest operations in spring, winter, and fall, and subsurface drains and open ditches are used.

This soil is well suited only to wet-tolerant grasses and legumes, mainly Kentucky-31 fescue, ladino clover, and other similar species. It is poorly suited to alfalfa. The main pasture management practices are weed control, use of lime and fertilizer, and controlled grazing.

The potential productivity for northern red oak on this soil is moderately high. The estimated average annual production of wood per acre is 275 board-feet. A high mortality rate for tree seeds, cuttings, and seedlings is a limitation caused by droughtiness in summer. The fragipan restricts root penetration, resulting in windthrow. The main limitation for harvesting is wetness. The soil is soft when wet and does not support heavy equipment. In some areas wetness and windthrow can be overcome by planting wet-tolerant species and harvesting during the dry seasons.

This soil is generally poorly suited to building site development and onsite waste disposal. The heaving of road surfaces, caused by frost action in the winter, and insufficient strength and stability to support vehicular traffic are limitations but in places can be overcome by strengthening or replacing the base material. The permeability and the seasonal high water table are limitations for septic tank absorption fields, sanitary landfills, and building sites.

The land capability classification is IIIw.

12D—Catlett gravelly silt loam, 15 to 25 percent slopes. This soil is shallow, moderately steep, and well drained. It is on side slopes. Slopes are commonly convex but range to slightly concave in a few places. The areas are long and narrow and conform to the contour of the landscape. Shallow drainageways cross the areas at common intervals. The areas range from about 2 to 50 acres.

Typically, the surface layer is dark brown gravelly silt loam 1 inch thick. The subsurface layer is dark brown gravelly silt loam 5 inches thick. The subsoil is grayish brown very gravelly silt loam 6 inches thick. The upper part of the substratum is multicolored very gravelly silt loam 5 inches thick. The lower part is partially weathered light gray hornfels and granulite 8 inches thick. Bedrock is at a depth of 26 inches.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Albano, Arcola, Nestoria, and Sycoline soils. Also included are a few areas that have little or no subsoil and are more shallow to rock. Inclusions make up approximately 20 percent of this map unit.

Major soil properties—

Permeability: Surface layer—moderately rapid; subsoil—moderate
Available water capacity: Very slow
Surface runoff: Rapid
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: 10 to 20 inches, restricted by rock
Depth to bedrock: 10 to 20 inches, soft
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most of the acreage of this soil is woodland. A few acres are in pasture.

This soil is poorly suited to cultivated crops, especially corn and soybeans. Droughtiness and slope are the main limitations.

This soil is poorly suited to grasses, hay, and legumes. Droughtiness, slope, and the low fertility level are the main limitations. The main pasture management practices are use of lime and fertilizer, weed control, and controlled grazing. Kentucky-31 fescue, ladino clover, and other drought-resistant species are suitable.

The potential productivity for northern red oak on this soil is moderate. The estimated average annual production of wood per acre is 250 board-feet on the north-facing slopes and 200 board-feet on the south-facing slopes. Tree seeds, cuttings, and seedlings have a high rate of mortality because of droughtiness. The shallow rooting depth makes trees on this soil susceptible to windthrow. Slope is the major limitation for harvesting.

This soil is very poorly suited to building site development and onsite waste disposal. The depth to bedrock, slope, seepage, and droughtiness limit the soil for most uses.

The land capability classification is VIe.

13B—Catlett-Sycoline complex, 2 to 7 percent slopes. This unit is on ridgetops and side slopes. Slopes are commonly convex but range to slightly concave in a few places. The areas are long and narrow to irregularly rounded and conform to the contour of the landscape. They range from about 2 to 50 acres. Shallow drainageways cross the areas at common intervals. The areas of the Catlett and Sycoline soils are so closely associated and are so intermingled or are so small that they could not be mapped separately. This complex is about 40 percent shallow and well drained Catlett soils, 40 percent moderately deep and moderately well drained and somewhat poorly drained Sycoline soils, and 20 percent other soils.

Typically, the surface layer of the Catlett soils is dark brown gravelly silt loam 1 inch thick. The subsurface

layer is dark brown gravelly silt loam 5 inches thick. The subsoil is grayish brown very gravelly silt loam 6 inches thick. The substratum is 14 inches thick. It is multicolored very gravelly silt loam in the upper part and partially weathered light gray hornfels and granulite in the lower part. Bedrock is at a depth of 26 inches.

Typically, the surface layer of the Sycoline soils is very dark grayish brown silt loam 2 inches thick. The subsurface layer is grayish brown silt loam 7 inches thick. The subsoil is 17 inches thick. It is yellowish brown silty clay loam in the upper 13 inches and mottled silty clay loam in the lower 4 inches. The substratum is brownish yellow silt loam 7 inches thick. Partially weathered light gray to gray granulite rock is at a depth of 35 inches.

Included with this unit in mapping are small areas, generally less than 2 acres each, of Albano, Arcola, Nestoria, and Kelly soils. Also included are a few areas that have little or no subsoil and are more shallow to rock.

Major properties of the Catlett soils

Permeability: Surface layer—moderately rapid; subsoil—moderate
Available water capacity: Very low
Surface runoff: Rapid
Erosion hazard: Moderate
Organic matter content: Low
Natural fertility. Low
Soil reaction. Very strongly acid or strongly acid
Depth of the root zone: 10 to 20 inches, restricted by rock
Depth to bedrock: 10 to 20 inches, soft
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Major properties of the Sycoline soils—

Permeability: Surface layer—moderately slow; subsoil—very slow
Available water capacity: Low
Surface runoff: Rapid
Erosion hazard: Moderate
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid to strongly acid
Depth of the root zone: 20 to 40 inches, restricted by rock and wetness
Depth to bedrock: 20 to 40 inches, hard
Shrink-swell potential: Moderate
Depth to the seasonal high water table: 18 to 36 inches, perched
Flooding: None

Most of the acreage of this unit is woodland. A few acres are in pasture or cultivated.

The Catlett soils are unsuited to cultivated crops, especially corn and soybeans. Droughtiness is the main limitation. The Sycoline soils are poorly suited; wetness in the early spring is the main limitation.

This unit is moderately well suited to grasses, hay, and legumes. Droughtiness, rock fragments in the soil, and the low level of fertility are the main limitations. The main pasture management practices are use of lime and fertilizer, weed control, and controlled grazing. Kentucky-31 fescue, ladino clover, and other drought-resistant species are suitable.

The potential productivity for northern red oak on these soils is moderate. The estimated average annual production of wood per acre is 250 board-feet. Tree seeds, cuttings, and seedlings on the Catlett soils have a high rate of mortality because of droughtiness. The shallow rooting depth in the Catlett soils makes trees on those soils susceptible to windthrow. The Sycoline soils do not support heavy equipment during wet seasons.

This map unit is very poorly suited to building site development and onsite waste disposal. The depth to bedrock, seepage, and droughtiness limit the Catlett soils for most uses. The depth to rock and the seasonal high water table limit the Sycoline soils.

The land capability classification is IIIe.

13C—Catlett-Sycoline complex, 7 to 15 percent slopes. This unit is on ridgetops and side slopes. It is strongly sloping. Slopes are commonly convex but range to slightly concave in a few places. The areas are long and narrow to irregularly rounded and conform to the contour of the landscape. They range from about 2 to 50 acres. Shallow drainageways cross the areas at common intervals. The areas of the Catlett and Sycoline soils are so closely associated and are so intermingled or are so small that they could not be mapped separately. This complex is about 40 percent shallow and well drained Catlett soils, 40 percent moderately deep and moderately well drained and somewhat poorly drained Sycoline soils, and 20 percent other soils.

Typically, the surface layer of the Catlett soils is dark brown gravelly silt loam 1 inch thick. The subsurface layer is dark brown gravelly silt loam 5 inches thick. The subsoil is grayish brown very gravelly silt loam 6 inches thick. The substratum is 14 inches thick. It is multicolored very gravelly silt loam in the upper part and

partially weathered light gray hornfels and granulite in the lower part. Bedrock is at a depth of 26 inches.

Typically, the surface layer of the Sycoline soils is very dark grayish brown silt loam 2 inches thick. The subsurface layer is grayish brown silt loam 7 inches thick. The subsoil is 17 inches thick. It is yellowish brown silty clay loam in the upper 13 inches and mottled silty clay loam in the lower 4 inches. The substratum is brownish yellow silt loam 7 inches thick. Partially weathered light gray to gray granulite rock is at a depth of 35 inches.

Included with this unit in mapping are small areas, generally less than 2 acres each, of Albano, Arcola, Nestoria, and Kelly soils. Also included are a few areas that have little or no subsoil and are more shallow to rock.

Major properties of the Catlett soils—

Permeability: Surface layer—moderately rapid; subsoil—moderate
Available water capacity: Very low
Surface runoff: Rapid
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: 10 to 20 inches, restricted by rock
Depth to bedrock: 10 to 20 inches, soft
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Major properties of the Sycoline soils

Permeability: Surface layer—moderately slow; subsoil—very slow
Available water capacity: Low
Surface runoff: Rapid
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid to strongly acid
Depth of the root zone: 20 to 40 inches, restricted by rock and wetness
Depth to bedrock: 20 to 40 inches, hard
Shrink-swell potential: Moderate
Depth to the seasonal high water table: 18 to 36 inches, perched
Flooding: None

Most of the acreage of this unit is woodland. A few acres are in pasture or are cultivated.

The Catlett soils are unsuited to cultivated crops. Droughtiness is the main limitation. The Sycoline soils are poorly suited; wetness in the early spring is the main limitation.

This unit is moderately well suited to grasses, hay, and legumes. Droughtiness, rock fragments in the soil, and the low level of fertility are the main limitations. The main pasture management practices are use of lime and fertilizer, weed control, and controlled grazing. Kentucky-31 fescue, ladino clover, and other drought-resistant species are suitable.

The potential productivity for northern red oak on these soils is moderate. The estimated average annual production of wood per acre is 250 board-feet. Tree seeds, cuttings, and seedlings on the Catlett soils have a high rate of mortality because of droughtiness. The shallow rooting depth in the Catlett soils makes trees on those soils susceptible to windthrow. The Sycoline soils do not support heavy equipment during wet seasons.

This map unit is very poorly suited to building site development and onsite waste disposal. The depth to bedrock, seepage, and droughtiness limit the Catlett soils for most uses. The depth to rock and the seasonal high water table limit the Sycoline soils.

The land capability classification is IVe.

14A—Codorus loam, 0 to 2 percent slopes. This soil is very deep, level to nearly level, and moderately well drained and somewhat poorly drained. It is on broad, low flood plains along the larger streams in the county. The areas of this soil are commonly elongated and follow the course of the adjacent stream. The areas range from 2 to 20 areas.

Typically, the surface layer is brown to dark brown loam 12 inches thick. The subsoil is dark yellowish brown loam 30 inches thick. The substratum is yellowish brown sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small intermingled areas, generally less than 2 acres each, of Comus, Hatboro, Elsinboro, and Delanco soils. Also included are spots of very gravelly and cobbly soils in old abandoned channels. Included soils make up about 15 percent of the map unit.

Major soil properties—

Permeability: Surface layer—moderate; subsoil—moderate; substratum—moderately rapid to rapid
Available water capacity: High
Surface runoff: Slow
Erosion hazard: Slight

Organic matter content: Low to moderate
Natural fertility: Medium
Soil reaction: Surface layer—very strongly acid to moderately acid; subsoil and substratum—strongly acid to slightly acid
Depth of the root zone: 30 to 40 inches, restricted by wetness
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to the seasonal high water table: 12 to 24 inches, apparent
Flooding: Frequent

Most areas of this soil are woodland. A few areas are in cultivated crops, hay, or pasture.

This soil is well suited to cultivated crops. The main management concerns are increasing organic matter content and providing subsurface drainage, protection from flooding, and lime and fertilizer. Cover crops and grasses and legumes in the cropping system and crop residue in and on the soil help increase organic matter content and maintain the tilth of the soil. Corn, soybeans, and small grains are suitable crops.

This soil is well suited to grasses and moderately well suited to legumes. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. The main pasture management practices are use of proper stocking rates, rotation grazing, deferred grazing, and use of lime and fertilizer. Orchardgrass, Kentucky-31 fescue, red clover, and ladino clover are suitable species.

The potential productivity for northern red oak on this soil is moderately high. The estimated average annual production of wood per acre is 450 board-feet. Seeds and seedlings survive and grow well on this soil.

This soil is generally unsuited to building site development and onsite waste disposal. Flooding is the main limitation for building site development. Flooding, the seasonal high water table, and pollution of ground water are the main limitations for onsite waste disposal. Flood-control structures will overcome some of these limitations.

The land capability classification is IIw.

15A—Comus loam, 0 to 2 percent slopes. This soil is very deep, level to nearly level, and well drained. It is on broad, low flood plains along the larger streams in the county. The areas of this soil are commonly elongated and follow the course of the adjacent stream. The areas range from 2 to 20 acres.

Typically, the surface layer is brown to dark brown loam 10 inches thick. The subsoil is brown to dark brown loam 29 inches thick. The substratum is strong brown and dark yellowish brown sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small intermingled areas, generally less than 2 acres each, of Codorus, Hatboro, Elsinboro, and Delanco soils. Also included are spots of very gravelly and cobbly soils in abandoned channels. Included soils make up about 15 percent of the map unit.

Major soil properties –

Permeability: Surface layer—moderate; subsoil—moderate; substratum—moderate to moderately rapid
Available water capacity: Moderate
Surface runoff: Slow
Erosion hazard: Slight
Organic matter content: Low to moderate
Natural fertility: Medium
Soil reaction: Very strongly acid to moderately acid
Depth of the root zone: More than 60 inches
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: Occasional

Most areas of this soil are woodland. The rest are in cultivated crops, hay, or pasture.

This soil is well suited to cultivated crops. The main management concerns are the need to increase organic matter content and the need for lime and fertilizer. Conservation tillage, cover crops and grasses and legumes in the cropping system, and crop residue in and on the soil help increase organic matter, maintain the tilth, and reduce erosion. Corn, soybeans, and small grains are suitable crops.

This soil is well suited to grasses and legumes. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. The main pasture management practices are use of proper stocking rates, rotation grazing, deferred grazing, and use of lime and fertilizer. Orchardgrass, Kentucky-31 fescue, red clover, and ladino clover are suitable species.

The potential productivity for northern red oak on this soil is moderately high. The estimated average annual production of wood per acre is 400 board-feet. Seeds and seedlings survive and grow well on this soil.

This soil is generally unsuited to building site development and onsite waste disposal. Flooding is the main limitation for building site development. Flooding

and pollution of ground water are the main limitations for onsite waste disposal. Flood-control structures help overcome some of these limitations.

The land capability classification is IIw.

16A—Delanco fine sandy loam, 0 to 4 percent slopes. This soil is very deep, nearly level to gently sloping, and moderately well drained. It is on low stream terraces. Slopes are slightly convex to slightly concave. The areas are irregularly rounded to long and narrow and range from about 2 to 20 acres.

Typically, the surface layer is 11 inches thick. It is very dark grayish brown fine sandy loam in the upper 2 inches and yellowish brown sandy loam in the lower 9 inches. The subsoil is 34 inches thick. It is yellowish brown loam in the upper part, brownish yellow clay loam in the middle part, and brownish yellow sandy clay loam in the lower part. The substratum is multicolored stratified alluvial sediments to a depth of 60 inches or more.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Codorus, Comus, Elsinboro, and Hatboro soils. Also included are small areas with a surface layer of sand, loamy sand, or gravelly sand. A few small areas are in low depressions that have water on the surface during and after heavy rainstorms. Included soils make up about 20 percent of this map unit.

Major soil properties—

Permeability: Surface layer—moderate; subsoil—moderately slow, substratum—moderate
Available water capacity: High
Surface runoff: Slow
Erosion hazard: Slight
Organic matter content: Moderate
Natural fertility: Low
Soil reaction: Extremely acid to moderately acid
Depth of the root zone: 20 to 40 inches, restricted by wetness
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to the seasonal high water table: 12 to 30 inches
Flooding: Rare

Most areas of this soil are woodland. The rest are used for cultivated crops, hay, and pasture.

This soil is well suited to cultivated crops. It is moderately well suited to small grains. Wetness in winter and spring and rare flooding are the main limitations. A main management concern is the need for surface and subsurface drainage systems. Conservation tillage and cover crops and grasses and legumes in the cropping system help increase organic matter content and maintain the tilth of the soil. Crops respond well to applications of lime and fertilizer. Corn, soybeans, and mixed hay are suitable crops.

This soil is well suited to most grasses and legumes except alfalfa. The main pasture management practices are use of lime and fertilizer, weed control, and controlled grazing. Orchardgrass, Kentucky-31 fescue, and ladino and red clover are suitable species.

The potential productivity for black oak on this soil is moderately high. The estimated average annual production of wood per acre is 300 board-feet. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed. The main limitation for harvesting is wetness. The soil is soft when wet and does not support heavy equipment.

This soil is poorly suited to building site development and onsite waste disposal. The flooding and seasonal high water table are the main limitations for building site development. Subsurface drainage and diversion of surface water help overcome those limitations. The soil does not have sufficient strength and stability to support vehicular traffic, but in places this limitation can be overcome by strengthening or replacing the base material. Sealing the bottom of the sewage lagoon helps to prevent seepage.

The land capability classification is IIw.

17A—Dulles silt loam, 0 to 4 percent slopes. This soil is deep, level to gently sloping, and moderately well drained to somewhat poorly drained. It is on toe slopes, in saddles, and around heads of drainageways. Slopes are commonly convex but range to concave. The areas are irregularly rounded or oblong and range from about 2 to 20 acres.

Typically, the surface layer is dark brown silt loam 8 inches thick. The subsoil is about 35 inches thick. It is yellowish brown silty clay loam in the upper part, yellowish brown silty clay in the middle part, and light gray clay in the lower part. The substratum is red partially weathered siltstone 16 inches thick. Bedrock is at a depth of 59 inches.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Albano, Arcola, Calverton, Nestoria, and Panorama soils. Included soils make up approximately 20 percent of this map unit.

Major soil properties—

Permeability: Surface layer—moderate; upper part of the subsoil—slow; lower part of the subsoil and all of substratum—very slow

Figure 1.—Planting soybeans on Dulles silt loam, 0 to 4 percent slopes.

Available water capacity: Moderate
Surface runoff: Slow
Erosion hazard: Moderate
Organic matter content: Low
Natural fertility: Medium
Soil reaction: Very strongly acid to moderately acid
Depth of the root zone: 20 to 40 inches, restricted by wetness
Depth to bedrock: 40 to 60 inches, hard
Shrink-swell potential: High
Depth to the seasonal high water table: 12 to 30 inches, apparent
Flooding: None

Most of this soil is in cultivated crops, pasture, and hay (fig. 1). A few areas are woodland.

This soil is poorly suited to cultivated crops and small grains. The main limitation is wetness in the fall, winter, and spring. Artificial drainage is needed for row crops. Corn, soybeans, and small grains are suitable species if artificial drainage is used.

This map unit is moderately well suited to grasses and legumes that tolerate wet conditions. It is very poorly suited to alfalfa. The main management practices are use of lime and fertilizer, weed control, and controlled grazing. Kentucky-31 fescue, ladino clover, and similar species are suitable.

The potential productivity for northern red oak on this soil is moderate. The estimated average annual production of wood per acre is 250 board-feet. Tree seeds, cuttings, and seedlings have a high mortality rate because of wetness. Trees that tolerate wetness are best suited. The soil is soft when wet and does not support heavy harvesting equipment. Harvesting during dry seasons helps reduce rutting by heavy equipment.

This soil is poorly suited to building site development and onsite waste disposal. The seasonal high water

table and low strength limit this soil for building site development. The seasonal high water table and bedrock limit the soil for onsite waste disposal. Subsurface drainage in places can be used to help overcome the wetness if water disposal areas can be located.

The land capability classification is IVw.

18C—Dumfries sandy loam, 7 to 15 percent slopes. This soil is very deep, strongly sloping, and well drained. It is on narrow to medium-wide ridgetops and side slopes. Slopes are generally convex. The areas are long and narrow and range from about 2 to 20 acres.

Typically, the surface layer is dark grayish brown sandy loam 2 inches thick. The subsurface layer is light yellowish brown sandy loam 8 inches thick. The subsoil is 25 inches thick. It is brownish yellow sandy clay loam in the upper part and yellowish brown sandy loam in the lower part. The substratum is very pale brown and white sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Buckhall, Fairfax, Lunt, and Neabsco soils. The included soils make up about 25 percent of this unit.

Major soil properties—

Permeability: Moderately rapid throughout
Available water capacity: Low
Surface runoff: Rapid
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are woodland. A few areas are in cultivated crops and hay and pasture.

This soil is poorly suited to cultivated crops. The main limitations are slope and the low fertility level. Cover crops and grasses and legumes in the cropping system, conservation tillage, contour farming, and crop residue in and on the soil help conserve moisture and control erosion. Corn, soybeans, wheat, and oats are suitable species.

This soil is suited to grasses and legumes. The main pasture management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, ladino clover, and alfalfa are suitable species.

The potential productivity for white oak on this soil is moderately high. The estimated average annual production of wood per acre is 280 board-feet. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed.

This soil is suitable for building site development and onsite waste disposal. Some areas do not have sufficient strength and stability to support vehicular traffic, but in places this limitation can be overcome by strengthening or replacing the base material. The permeability is a limitation for sanitary landfills and daily cover for landfills. Leaching of pollutants into ground water is a hazard. Replacing the sandy material with clayey materials helps to prevent this hazard. Slope is a limitation for sewage lagoons.

The land capability classification is IVs.

18D—Dumfries sandy loam, 15 to 25 percent slopes. This soil is very deep, moderately steep, and well drained. It is on narrow side slopes. Slopes are generally convex. The areas are long and narrow and range from about 2 to 20 acres.

Typically, the surface layer is dark grayish brown sandy loam 2 inches thick. The subsurface layer is light yellowish brown sandy loam 8 inches thick. The subsoil is 25 inches thick. It is brownish yellow sandy clay loam in the upper part and yellowish brown sandy loam in the lower part. The substratum is very pale brown and white sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Buckhall, Fairfax, Lunt, and Neabsco soils. The included soils make up about 25 percent of this unit.

Major soil properties—

Permeability: Moderately rapid throughout
Available water capacity: Low
Surface runoff: Rapid
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are woodland. A few areas are in hay and pasture.

This soil is very poorly suited to cultivated crops. The main limitation is slope.

This soil is poorly suited to grasses and legumes. The main pasture management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, ladino clover, and alfalfa are suitable species.

The potential productivity for white oak on this soil is moderately high. The estimated average annual production of wood per acre is 280 board-feet on north-facing slopes and 270 board-feet on south-facing slopes. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed. Slope is the main limitation for planting and harvesting. Erosion is a hazard if skid trails are placed up and down the slope instead of on the contour.

This soil is suitable for building site development and onsite waste disposal. Slope is a main limitation. Some areas do not have sufficient strength and stability to support vehicular traffic, but in places this limitation can be overcome by strengthening or replacing the base material. The permeability is a limitation for sanitary landfills and daily cover for landfills. Leaching of pollutants into ground water is a hazard. Replacing the sandy material with clayey materials helps to prevent this hazard. Slope is a limitation for sewage lagoons.

The land capability classification is VIs.

18E—Dumfries sandy loam, 25 to 50 percent slopes. This soil is very deep, steep and very steep, and well drained. It is on narrow side slopes. Slopes are generally convex. The areas are long and narrow and range from about 2 to 20 acres.

Typically, the surface layer is dark grayish brown sandy loam 2 inches thick. The subsurface layer is light yellowish brown sandy loam 8 inches thick. The subsoil is 25 inches thick. It is brownish yellow sandy clay loam in the upper part and yellowish brown sandy loam in the lower part. The substratum is very pale brown and white sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Buckhall, Fairfax, Lunt, and Neabsco soils. The included soils make up about 25 percent of this unit.

Major soil properties—

Permeability: Moderately rapid throughout
Available water capacity: Low
Surface runoff: Very rapid
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are woodland.

This soil is generally unsuited to cultivated crops. The main limitation is slope.

This soil is poorly suited to grasses and legumes. The main pasture management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, ladino clover, and alfalfa are suitable species.

The potential productivity for white oak on this soil is moderately high. The estimated average annual production of wood per acre is 280 board-feet on north-facing slopes and 270 board-feet on south-facing slopes. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed. Slope is the main limitation for planting and harvesting. Erosion is a hazard if skid trails are placed up and down the slope instead of on the contour.

This soil is generally unsuitable for building site development and onsite waste disposal. Slope is a main limitation.

The land capability classification is VIIe.

19B—Elioak loam, 2 to 7 percent slopes. This soil is very deep, gently sloping, and well drained. It is on narrow to medium-wide ridges. Slopes are generally convex, but some small areas are concave. The areas are irregularly rounded or oblong and range from about 2 to 20 acres.

Typically the surface layer is brown loam 5 inches thick. The subsoil is red clay about 36 inches thick. The substratum is weak red loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Baile, Buckhall, Glenelg, and Manor soils. Also included are small eroded areas of clay loam or clay. A few small areas are shallower to bedrock than this Elioak soil, and a few have a thinner subsoil and less clay. Included soils make up about 20 percent of this unit.

Major soil properties—

Permeability: Moderate throughout
Available water capacity: Moderate
Surface runoff: Medium
Erosion hazard: Moderate
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone. More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are woodland. A few areas are in cultivated crops, pasture, or hay.

This soil is well suited to cultivated crops. The main limitations are the erosion hazard and the low fertility level. Cover crops, conservation tillage, and crop residues in and on the soil help conserve moisture and control erosion.

This soil is well suited to grasses and legumes, including alfalfa. The main pasture management practices are use of lime and fertilizer, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, ladino clover, and red clover are suitable species.

The potential productivity for black oak on this soil is moderately high. The estimated average annual production of wood per acre is 300 board-feet. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed.

This soil is suitable for building site development and onsite waste disposal. It does not have sufficient strength and stability to support vehicular traffic, but in places this limitation can be overcome by strengthening or replacing the base material. The permeability is a limitation for septic tank absorption fields, but increasing the absorption area or placing drainage ditches in the substratum helps overcome the permeability. Sealing the bottom of the sewage lagoon helps prevent seepage. The high clay content makes this soil difficult to spread on landfills, because the soil is sticky when wet. Mixing or replacing the clayey material with a soil with less clay helps overcome this limitation.

The land capability classification is IIe.

19C—Elioak loam, 7 to 15 percent slopes. This soil is very deep, strongly sloping, and well drained. It is on narrow ridges and side slopes. Slopes are generally convex, but some small areas are concave. The areas are irregularly rounded or oblong and range from about 2 to 25 acres.

Typically the surface layer is brown loam 5 inches thick. The subsoil is red clay about 36 inches thick. The substratum is weak red loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Baile, Buckhall, Glenelg, and Manor soils. Also included are small eroded areas of clay loam or clay. A few small areas are shallower to bedrock than this Elioak soil, and a few have a thinner subsoil and less clay. Included soils make up about 20 percent of this unit.

Major soil properties—

Permeability: Moderate throughout
Available water capacity: Moderate
Surface runoff: Medium
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are woodland. A few areas are in pasture or hay.

This soil is moderately well suited to cultivated crops. The main limitations are the erosion hazard and the low fertility level. Cover crops, conservation tillage, and crop residues in and on the soil help conserve moisture and control erosion.

This soil is well suited to grasses and legumes, including alfalfa. The main pasture management practices are use of lime and fertilizer, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, ladino clover, and red clover are suitable species.

The potential productivity for black oak on this soil is moderately high. The estimated average annual production of wood per acre is 300 board-feet. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed.

This soil is suitable for building site development and onsite waste disposal. Slope limits sewage lagoons. The soil does not have sufficient strength and stability to support vehicular traffic, but in places this limitation can be overcome by strengthening or replacing the

base material. The permeability is a limitation for septic tank absorption fields, but increasing the absorption area or placing drainage ditches in the substratum helps overcome the permeability. Sealing the bottom of the sewage lagoon helps prevent seepage. The high clay content makes this soil difficult to spread on landfills, because the soil is sticky when wet. Mixing or replacing the clayey material with a soil with less clay helps overcome this limitation.

The land capability classification is IIIe.

20B—Elsinboro sandy loam, 2 to 7 percent slopes. This soil is very deep, gently sloping, and well drained. It is on low stream terraces. Slopes are commonly convex but range to concave. The areas of this soil are irregularly rounded to long and narrow and range from about 2 to 20 acres.

Typically, the surface layer is dark yellowish brown sandy loam 9 inches thick. The subsoil is 35 inches thick. It is strong brown sandy clay loam in the upper part and strong brown sandy loam in the lower part. The substratum is strong brown gravelly sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Codorus, Comus, Delanco, and Hatboro soils. Also included are small areas with slopes of as much as 15 percent. A few small areas have a surface layer and subsoil of sand, gravelly sand, loamy sand, or gravelly loamy sand. A few areas have a redder subsoil than this Elsinboro soil. Included soils make up about 20 percent of this map unit.

Major soil properties—

Permeability: Surface layer—moderate; subsoil—moderate; substratum—moderate to moderately rapid
Available water capacity. Moderate
Surface runoff: Slow to medium
Erosion hazard: Moderate
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 60 inches
Flooding: Rare

Most areas of this soil are woodland. A few areas are in pasture, hay, and cultivated crops.

This soil is well suited to cultivated crops and small grains. Crops respond well to lime and fertilizers. Conservation tillage, cover crops, and crop residue in and on the soil help conserve moisture and control erosion. Corn, soybeans, wheat, oats, and hay are suitable crops.

This soil is well suited to grasses and legumes. The main pasture management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, ladino clover, and alfalfa are suitable species.

The potential productivity for black oak on this soil is moderately high. The estimated average annual production of wood per acre is 300 board-feet. Tree seeds, cuttings, and seedlings survive and grow well on this soil if competing vegetation is controlled or removed.

This soil is suited to building site development and onsite waste disposal. Very brief flooding in the spring and winter and seepage are the main limitations for building site development. In many places the brief flooding can be overcome by diverting the surface water. Sealing the bottom of the sewage lagoon helps prevent seepage. In some areas site preparation is not feasible because of the flood hazard.

The land capability classification is IIe.

21B—Fairfax loam, 2 to 7 percent slopes. This soil is very deep, gently sloping, and well drained. It is on medium-wide to broad ridgecrests. Slopes range from slightly convex to concave. The areas of this soil are irregularly rounded to oblong and range from 2 to 25 acres. Shallow swales are in some areas.

Typically, the surface layer is 8 inches thick. It is very dark grayish brown loam in the upper 1 inch and yellowish brown silt loam in the lower 7 inches. The subsoil is 52 inches thick. It is brownish yellow clay loam in the upper part and brownish yellow, strong brown, and red clay in the lower part. The substratum is multicolored clay loam to a depth of 75 inches or more.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Buckhall, Elioak, Glenelg, Meadowville, and Glenville soils. Some small included areas have a fragipan. Also included are small eroded areas of clay loam. A few areas have a surface layer of gravelly silt loam. Inclusions make up about 20 percent of this map unit.

Major soil properties—

Permeability: Surface layer—moderately rapid; subsoil and substratum—moderate

Available water capacity: High
Surface runoff: Medium
Erosion hazard: Moderate
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are woodland. Some small areas are used for cultivated crops, hay, and pasture.

This soil is well suited to cultivated crops, small grains, and hay. Crops respond well to fertilizer and lime. Conservation tillage and rotational cropping help to conserve moisture and control erosion. Corn, soybeans, wheat, and oats are suitable crops.

This soil is well suited to grasses and legumes. The main pasture management practices are use of lime and fertilizer, weed control, and controlled grazing. Orchardgrass, Kentucky-31 fescue, ladino clover, red clover, and alfalfa are suitable species.

The potential productivity for northern red oak on this soil is moderately high. The estimated average annual production of wood per acre is 280 board-feet. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed.

This soil is suitable for building site development and onsite waste disposal. Slope limits sewage lagoons. The soil does not have sufficient strength and stability to support vehicular traffic, but in places this limitation can be overcome by strengthening or replacing the base material. The permeability is a limitation for septic tank absorption fields, but increasing the absorption area or placing drainage ditches in the substratum helps overcome the permeability. Sealing the bottom of the sewage lagoon helps prevent seepage. The high clay content makes this soil difficult to spread on landfills, because the soil is sticky when wet. Mixing or replacing the clayey material with a soil with less clay helps overcome this limitation.

The land capability classification is IIe.

21C—Fairfax loam, 7 to 15 percent slopes. This soil is very deep, strongly sloping, and well drained. It is on side slopes. The areas range from 2 to 25 acres. Drainageways are in some areas.

Typically, the surface layer is 8 inches thick. It is very dark grayish brown loam in the upper 1 inch and yellowish brown silt loam in the lower 7 inches. The subsoil is 52 inches thick. It is brownish yellow clay loam in the upper part and brownish yellow, strong brown, and red clay in the lower part. The substratum is multicolored clay loam to a depth of 75 inches or more.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Buckhall, Elioak, Glenelg, Meadowville, and Glenville soils. Some small included areas have a fragipan. Also included are small eroded areas of clay loam. A few areas have a surface layer of gravelly silt loam. Inclusions make up about 20 percent of this map unit.

Major soil properties—

Permeability: Surface layer—moderately rapid; subsoil and substratum—moderate
Available water capacity: High
Surface runoff: Medium
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are woodland. A few areas are used for cultivated crops, hay, and pasture.

This soil is moderately well suited to cultivated crops, small grains, and hay. Crops respond to fertilizer and lime. Conservation tillage and rotational cropping help to conserve moisture and control erosion. Corn, soybeans, wheat, and oats are suitable crops.

This soil is well suited to grasses and legumes. The main pasture management practices are use of lime and fertilizer, weed control, and controlled grazing. Orchardgrass, Kentucky-31 fescue, ladino clover, red clover, and alfalfa are suitable species.

The potential productivity for northern red oak on this soil is moderately high. The estimated average annual production of wood per acre is 280 board-feet. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed.

This soil is suitable for building site development and onsite waste disposal. Slope limits sewage lagoons. The soil does not have sufficient strength and stability to support vehicular traffic, but in places this limitation can be overcome by strengthening or replacing the base material. The permeability is a limitation for septic

tank absorption fields, but increasing the absorption area or placing drainage ditches in the substratum helps overcome the permeability. Sealing the bottom of the sewage lagoon helps prevent seepage. The high clay content makes this soil difficult to spread on landfills, because the soil is sticky when wet. Mixing or replacing the clayey material with a soil with less clay helps overcome this limitation.

The land capability classification is IIIe.

22A—Featherstone silt loam, 0 to 1 percent slopes. This soil is very deep, level to nearly level, and very poorly drained. It is on flood plains at an elevation of less than 2 feet. The areas are not flooded daily but are subject to high seasonal tides and storm tides. They are commonly long and narrow and range from 2 to 20 acres.

Typically, the surface layer is very dark grayish brown mucky silt loam about 14 inches thick. The substratum is dark grayish brown loam and dark yellowish brown loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas, generally less than 2 acres each, of soils that are not influenced by storm tides and high seasonal tides. Also included are soils that are dominantly made up of organic matter. Included soils make up about 20 percent of this unit.

Major soil properties—

Permeability: Moderate throughout
Available water capacity: High
Surface runoff: Very slow
Erosion hazard: Slight
Organic matter content: High
Natural fertility: Medium
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: Surface to 12 inches, restricted by water table
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to the seasonal high water table: 1 foot above the surface to the surface
Flooding: Frequent

This soil mainly provides wildlife habitat. The plant cover is dominantly cattails, skunk cabbage, and reeds.

This soil is very poorly suited to cultivated crops, small grains, alfalfa, and grasses and legumes. The main limitation is wetness.

The potential productivity for sweetgum on this soil is moderate. The estimated average annual production of wood per acre is 180 board-feet. Tree seeds, cuttings, and seedlings have a high rate of mortality because of wetness. Planting trees that tolerate wetness helps to overcome this limitation. The major limitation for planting and harvesting is wetness.

The high water table and flooding make this soil very poorly suited to building site development and onsite waste disposal.

The land capability classification is VIIw.

23C—Gaila sandy loam, 7 to 15 percent slopes. This soil is very deep, strongly sloping, and well drained. It is on side slopes. The areas are generally long and narrow and winding and conform to the irregular contour of the landscape. Slopes are commonly convex but range to slightly concave. Shallow drainageways and deep gullies cross the areas at common intervals. The areas range from 2 to 25 acres.

Typically, the surface layer is dark brown sandy loam 7 inches thick. The subsoil is strong brown sandy clay loam 8 inches thick. The substratum extends to a depth of 60 inches or more. The upper part is multicolored sandy loam, and the lower part is multicolored loamy sand.

Included with this unit in mapping are small areas, generally less than 2 acres each, of Buckhall, Fairfax, Glenelg, and Glenville soils. A few other areas have no subsoil, a few areas have a surface layer of gravelly sandy loam, and a few have bedrock at a depth of less than 5 feet. Inclusions make up about 20 percent of this map unit.

Major soil properties—

Permeability: Surface layer—moderate; subsoil—moderate; substratum—moderately rapid
Available water capacity: Low to moderate
Surface runoff: Moderately rapid
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low
Soil reaction: Extremely acid to moderately acid
Depth of the root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are woodland; a few areas are in pasture.

This soil is poorly suited to cultivated crops. Slope, droughtiness, and erosion are the main management

limitations. Conservation tillage and winter cover crops help control erosion. Crop residue in or on the soil and other organic material help to improve fertility and increase the available water capacity.

This soil is suited to most grasses and legumes. The main limitations are droughtiness and slope. The main pasture management practices are weed control, use of lime and fertilizer, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, and ladino clover, are suited species.

The potential productivity for northern red oak on this soil is moderately high. The estimated average annual production of wood per acre is 300 board-feet. Tree seeds, cuttings, and seedlings have a high mortality rate because of droughtiness. Slope is the main hazard for harvesting and planting trees. Erosion is a hazard if skid trails are up and down the slope instead of on the contour.

This soil is suitable for building site development and onsite waste disposal. Slope is a limitation, but in places it can be overcome by grading and filling and by compaction. Sealing the bottom of landfills helps to prevent seepage.

The land capability classification is IIIe.

23D—Gaila sandy loam, 15 to 25 percent slopes. This soil is very deep, moderately steep, and well drained. It is on side slopes. The areas are generally long and narrow and are winding. They conform to the irregular contour of the landscape. Slopes are commonly convex but range to slightly concave. Shallow drainageways and deep gullies cross the areas at common intervals. The areas range from 2 to 25 acres.

Typically, the surface layer is dark brown sandy loam 7 inches thick. The subsoil is strong brown sandy clay loam 8 inches thick. The substratum extends to a depth of 60 inches or more. The upper part is multicolored sandy loam, and the lower part is multicolored loamy sand.

Included with this unit in mapping are small areas, generally less than 2 acres each, of Buckhall, Fairfax, Glenelg, and Glenville soils. A few other areas have no subsoil, a few areas have a surface layer of gravelly sandy loam, and a few have bedrock at a depth of less than 5 feet. Inclusions make up about 20 percent of this map unit.

Major soil properties—

Permeability: Surface layer—moderate; subsoil—moderate; substratum—moderately rapid
Available water capacity: Low to moderate
Surface runoff: Rapid
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low
Soil reaction: Extremely acid to moderately acid
Depth of the root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are woodland.

This soil is generally unsuited to cultivated crops. Slope, droughtiness, and erosion are the main management limitations.

This soil is poorly suited to most grasses and legumes. The main limitations are droughtiness and slope. The main pasture management practices are weed control, use of lime and fertilizer, use of proper stocking rates, and controlled grazing.

The potential productivity for northern red oak on this soil is moderately high. The estimated average annual production of wood per acre is 300 board-feet. Tree seeds, cuttings, and seedlings have a high mortality rate because of droughtiness. Slope is the main hazard for harvesting and planting trees. Erosion is a hazard if skid trails are up and down the slope instead of on the contour.

This soil is poorly suited to building site development and onsite waste disposal. Slope is the major limitation.

The land capability classification is IVe.

23E—Gaila sandy loam, 25 to 50 percent slopes. This soil is very deep, steep and very steep, and well drained. It is on side slopes. The areas are generally long and narrow and are winding. They conform to the irregular contour of the landscape. Slopes are commonly convex but range to slightly concave. Shallow drainageways and deep gullies cross the areas at common intervals. The areas range from 2 to 25 acres.

Typically, the surface layer is dark brown sandy loam 7 inches thick. The subsoil is strong brown sandy clay loam 8 inches thick. The substratum extends to a depth of 60 inches or more. The upper part is multicolored sandy loam, and the lower part is multicolored loamy sand.

Included with this unit in mapping are small areas, generally less than 2 acres each, of Buckhall, Fairfax, Glenelg, and Glenville soils. A few other areas have no

subsoil, a few areas have a surface layer of gravelly sandy loam, and a few have bedrock at a depth of less than 5 feet. Inclusions make up about 20 percent of this map unit.

Major soil properties—

Permeability: Surface layer—moderate; subsoil—moderate; substratum—moderately rapid
Available water capacity: Low to moderate
Surface runoff: Rapid
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low
Soil reaction: Extremely acid to moderately acid
Depth of the root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are woodland.

This soil is generally unsuited to cultivated crops and most grasses and legumes. Slope, droughtiness, and erosion are the main management limitations.

The potential productivity for northern red oak on this soil is moderately high. The estimated average annual production of wood per acre is 300 board-feet on north-facing slopes and 275 board-feet on south-facing slopes. Tree seeds, cuttings, and seedlings have a high mortality rate because of droughtiness. Slope is the main hazard for harvesting and planting trees. Erosion is a hazard if skid trails are up and down the slope instead of on the contour.

This soil is poorly suited to building site development and onsite waste disposal. Slope is the major limitation.

The land capability classification is VIIe.

24B—Glenelg-Buckhall complex, 2 to 7 percent slopes. These soils are very deep, gently sloping, and well drained. They are on narrow to medium-wide ridgetops. Slopes are commonly convex, but some small areas are concave. The areas of this soil are irregularly rounded to long and narrow and range from about 2 to 50 acres. The Glenelg and Buckhall soils are so closely associated and intricately mixed that it was not practical to map them separately. This complex is about 45 percent Glenelg soils, 35 percent Buckhall soils, and 20 percent other soils.

Typically, the surface layer of the Glenelg soils is dark brown loam 2 inches thick. The subsurface layer is yellowish brown loam 3 inches thick. The subsoil is about 29 inches thick. The upper part of the subsoil is brown clay loam, the middle part is yellowish red clay loam, and the lower part is yellowish red sandy clay loam. The substratum is multicolored sandy loam to a depth of 60 inches or more.

Typically, the surface layer of the Buckhall soils is dark grayish brown loam 1 inch thick. The subsurface layer is light yellowish brown loam 6 inches thick. The subsoil is 36 inches thick. The upper part of the subsoil is brownish yellow clay loam, and the lower part is strong brown clay. The substratum extends to a depth of 60 inches or more. It is reddish yellow strongly weathered granite gneiss that crushes to sandy loam.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Fairfax, Hoadly, Meadowville, and Occoquan soils.

Major properties of the Glenelg soils—

Permeability: Moderate throughout
Available water capacity: Moderate
Surface runoff: Medium
Erosion hazard: Severe
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Major properties of the Buckhall soils—

Permeability: Surface layer—moderately rapid; subsoil—moderate; substratum—moderate
Available water capacity: moderate
Surface runoff: Medium
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: More than 60 inches
Depth to bedrock. More than 60 inches
Shrink-swell potential: Moderate
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most of the acreage of these soils is woodland. A few small areas are used for cultivated crops and hay and pasture.

These soils are suited to cultivated crops and small grains. The main limitations are erosion and low fertility.

Cover crops, conservation tillage, and crop residue in and on the soil help conserve moisture and control erosion. Corn, soybeans, wheat, and oats are suitable.

These soils are well suited to grasses and legumes. The main pasture management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, ladino clover, and alfalfa are suitable species.

The potential productivity for black oak on these soils is moderately high. The estimated average annual production of wood per acre is 300 board-feet. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed.

These soils are suited to building site development and onsite waste disposal. The Buckhall soils do not have sufficient strength and stability to support vehicular traffic, but in places this limitation can be overcome by strengthening or replacing the base material. The permeability is a limitation for septic tank absorption fields, but increasing the absorption area helps overcome the permeability. Sealing the bottom of sewage lagoons helps prevent seepage. The high clay content in the Buckhall soils limits them for covering landfills, because the soils are sticky when wet. Replacing the clayey soil helps overcome this limitation.

The land capability classification is IIe.

24C—Glenelg-Buckhall complex, 7 to 15 percent slopes. These soils are very deep, strongly sloping, and well drained. They are on narrow, rolling ridges and side slopes. Slopes are commonly convex, but some small areas are concave. The areas of this soil are irregularly rounded to long and narrow and range from about 2 to 50 acres. The Glenelg and Buckhall soils are so closely associated and intricately mixed that it was not practical to map them separately. This complex is about 45 percent Glenelg soils, 35 percent Buckhall soils, and 20 percent other soils.

Typically, the surface layer of the Glenelg soils is dark brown loam 2 inches thick. The subsurface layer is yellowish brown loam 3 inches thick. The subsoil is about 29 inches thick. The upper part of the subsoil is brown clay loam, the middle part is yellowish red clay loam, and the lower part is yellowish red sandy clay loam. The substratum is multicolored sandy loam to a depth of 60 inches or more.

Typically, the surface layer of the Buckhall soils is dark grayish brown loam 1 inch thick. The subsurface layer is light yellowish brown loam 6 inches thick. The subsoil is 36 inches thick. The upper part of the subsoil is brownish yellow clay loam, and the lower part is strong brown clay. The substratum extends to a depth of 60 inches or more. It is reddish yellow strongly weathered granite gneiss that crushes to sandy loam.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Fairfax, Hoadly, Meadowville, and Occoquan soils.

Major properties of the Glenelg soils—

Permeability: Moderate throughout
Available water capacity: Moderate
Surface runoff: Moderately rapid
Erosion hazard: Severe
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Major properties of the Buckhall soils—

Permeability: Surface layer—moderately rapid; subsoil—moderate; substratum—moderate
Available water capacity: Moderate
Surface runoff: Moderately rapid
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most of the acreage of these soils is woodland. A few small areas are used for cultivated crops and hay and pasture.

These soils are suited to cultivated crops and small grains. The main limitations are erosion and low fertility. Cover crops, conservation tillage, and crop residue in and on the soil help conserve moisture and control erosion. Corn, soybeans, wheat, and oats are suitable.

These soils are well suited to grasses and legumes. The main pasture management practices are use of lime and fertilizer, weed control, proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, ladino clover, and alfalfa are suitable species.

The potential productivity for black oak on these soils is moderately high. The estimated average annual production of wood per acre is 300 board-feet. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed.

These soils are suited to building site development and onsite waste disposal. The Buckhall soils do not have sufficient strength and stability to support vehicular traffic, but in places this limitation can be overcome by strengthening or replacing the base materials. The permeability is a limitation for septic tank absorption fields, but increasing the absorption area helps overcome the permeability. Sealing the bottom of sewage lagoons helps prevent seepage. The high clay content in the Buckhall soils limits them for covering landfills, because the soils are sticky when wet. Replacing the clayey soil helps overcome this limitation.

The land capability classification is IIIe.

24D—Glenelg-Buckhall complex, 15 to 25 percent slopes. These soils are very deep, moderately steep, and well drained. They are on side slopes. Slopes are commonly convex, but some small areas are concave. The areas of this soil are irregularly rounded to long and narrow and range from about 2 to 50 acres. The Glenelg and Buckhall soils are so closely associated and intricately mixed that it was not practical to map them separately. This complex is about 45 percent Glenelg soils, 35 percent Buckhall soils, and 20 percent other soils.

Typically, the surface layer of the Glenelg soils is dark brown loam 2 inches thick. The subsurface layer is yellowish brown loam 3 inches thick. The subsoil is about 29 inches thick. The upper part of the subsoil is brown clay loam, the middle part is yellowish red clay loam, and the lower part is yellowish red sandy clay loam. The substratum is multicolored sandy loam to a depth of 60 inches or more.

Typically, the surface layer of the Buckhall soils is dark grayish brown loam 1 inch thick. The subsurface layer is light yellowish brown loam 6 inches thick. The subsoil is 36 inches thick. The upper part of the subsoil is brownish yellow clay loam, and the lower part is strong brown clay. The substratum extends to a depth of 60 inches or more. It is reddish yellow strongly weathered granite gneiss that crushes to sandy loam.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Fairfax, Hoadly, Meadowville, and Occoquan soils.

Major properties of the Glenelg soils—

Permeability: Moderate throughout
Available water capacity: Moderate
Surface runoff: Rapid
Erosion hazard: Severe
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Major properties of the Buckhall soils—

Permeability: Surface layer—moderately rapid; subsoil—moderate; substratum—moderate
Available water capacity: Moderate
Surface runoff: Rapid
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most of the acreage of these soils is woodland. The rest is in hay and pasture.

These soils are poorly suited to cultivated crops and small grains. The main limitations are erosion and low fertility. Crop rotations dominated by grasses and legumes are needed.

The potential productivity for black oak on this unit is as follows: Glenelg soils on north-facing slopes—moderately high and an estimated average annual production of wood per acre of 300 board-feet; Glenelg soils on south-facing slopes—moderately high and an estimated average annual production of wood per acre of 275 board-feet; Buckhall soils on north-facing slopes—moderate and an estimated average annual production of wood per acre of 275 board-feet; Buckhall soils on north-facing slopes—moderate and an estimated average annual production of wood per acre of 225 board-feet. Slope is the only hazard for harvesting and planting.

These soils are suited to building site development and onsite waste disposal. The Buckhall soils do not have sufficient strength and stability to support vehicular traffic, but in places this limitation can be overcome by

strengthening or replacing the base materials. The permeability is a limitation for septic tank absorption fields, but increasing the absorption area helps overcome the permeability. Sealing the bottom of sewage lagoons helps prevent seepage. The high clay content in the Buckhall soils limits them for covering landfills, because the soils are sticky when wet. Replacing the clayey soil helps overcome this limitation.

The land capability classification is IIIe.

25A—Glenville loam, 0 to 4 percent slopes. This soil is very deep, nearly level and gently sloping, and moderately well drained and somewhat poorly drained. It is in depressions, on toe slopes, in saddle positions, and at the heads of drainageways. The areas are narrow to irregularly rounded and conform to the irregular contour of the landscape. Slopes are slightly concave to slightly convex. The areas range from about 2 to 30 acres.

Typically, the surface layer is very dark grayish brown loam 2 inches thick. The subsurface layer is yellowish brown loam 6 inches thick. The upper part of the subsoil is yellowish brown and brownish yellow clay loam 14 inches thick. The lower part is a hard, dense layer, called a fragipan, that is brownish yellow sandy loam 10 inches thick. The substratum is multicolored loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Baile, Buckhall, Elioak, Gaila, and Meadowville soils. Also included are a few areas with a surface layer of gravelly loam and a few small areas that do not have a fragipan. Included soils make up about 20 percent of this map unit.

Major soil properties—

Permeability: Surface layer—moderate; upper part of the subsoil—moderate; fragipan—slow to moderately slow; substratum—moderately slow
Available water capacity: Low
Surface runoff: Slow to medium
Erosion hazard: Slight
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: 20 to 40 inches, restricted by wetness and fragipan
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to the seasonal high water table: 6 to 36 inches, perched
Flooding: None

Most of the acreage of this soil is woodland. The remainder is in pasture and a few cultivated areas. This soil is classified as prime farmland.

This soil is poorly suited to cultivated crops. The seasonal high water table, general wetness, the shallow rooting depth, and the low fertility are the main limitations. The main management concern is providing subsurface drainage. Wetness often interferes with cultivation and harvesting in spring, winter, and fall. Small grains are subject to severe heaving by frost action in winter.

This soil is well suited to grasses and legumes that tolerate wet conditions. It is poorly suited to alfalfa. The main pasture management practices are weed control, use of artificial drainage, use of lime and fertilizer, and controlled grazing. Kentucky-31 fescue, orchardgrass, red clover, and ladino clover are commonly used species.

The potential productivity for northern red oak on this soil is moderately high. The estimated average annual production of wood per acre is 300 board-feet. The mortality rate for tree seeds, cuttings, and seedlings is a limitation because of wetness. The fragipan restricts root penetration and thus makes trees on this soil susceptible to windthrow. The main limitation for harvesting is wetness; the soil is soft when wet and does not support heavy equipment. In some areas wetness and windthrow can be overcome by planting wet-tolerant species and harvesting during dry seasons.

This soil is generally not suited to building site development or onsite waste disposal. The heaving of road surfaces, caused by frost action in the winter, and insufficient strength and stability to support vehicular traffic are limitations that in places can be overcome by strengthening or replacing the base material. The permeability and the seasonal high water table are limitations for septic tank absorption fields, sanitary landfills, and building sites.

The land capability classification is IIw.

26A—Hatboro silt loam, 0 to 2 percent slopes. This soil is very deep, poorly drained, and nearly level. It is on narrow to wide flood plains of creeks and rivers. This soil is commonly adjacent to the stream channel. The areas of this soil are commonly long, narrow, and winding. They range from 3 to 20 acres.

Typically, the surface layer of this soil is dark brown silt loam 7 inches thick. The subsoil is 41 inches thick. The upper part of the subsoil is grayish brown silt loam, the middle part is light brownish gray silty clay loam, and the lower part is gray sandy clay loam. The

substratum is gray stratified sandy sediment to a depth of 60 inches or more.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Codorus, Comus, and Elsinboro soils. Also included are small areas of soils that have a surface layer of loam, gravelly fine sandy loam, gravelly loam, cobbly fine sandy loam, or cobbly loam. Included soils make up as much as 30 percent of this unit.

Major soil properties—

Permeability: Surface layer—moderate; subsoil—moderate; substratum—moderately rapid
Available water capacity: Moderate
Surface runoff: Slow
Erosion hazard: Slight
Organic matter content: Low to moderate
Natural fertility: Medium
Soil reaction: Surface layer—very strongly acid to neutral; subsoil—very strongly acid to neutral; substratum—moderately acid or slightly acid
Depth of the root zone: 10 to 20 inches, restricted by wetness
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to the seasonal high water table: Surface to 6 inches, apparent
Flooding: Frequent

Most of the acreage of this soil is woodland. The rest is in pasture and a few cultivated areas.

This soil is poorly suited to cultivated crops, small grains, and alfalfa. The main limitations are frequent flooding and wetness in the spring, fall, and winter. Artificial drainage is needed for row crops.

This soil is well suited to grasses and moderately well suited to legumes. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Use of proper stocking rates, rotation grazing, deferred grazing, and use of lime and fertilizer are major pasture management practices. Orchardgrass, Kentucky-31 fescue, red clover, and ladino clover are suitable species.

The potential productivity for northern red oak on this soil is moderately high. The estimated average annual production of wood per acre is 300 board-feet. Tree seeds, cuttings, and seedlings of wet-tolerant species grow well if competing vegetation is controlled. The water table restricts root penetration and thus makes trees on this soil susceptible to windthrow. The major limitations for planting and harvesting are wetness and frequent flooding in the winter and spring. Wetness, flooding, and windthrow can be overcome in some areas by planting wet-tolerant species and harvesting during dry seasons.

This soil is very poorly suited to building site development and onsite waste disposal. Frequent flooding and the high water table are the main limitations. Subsurface drainage is suitable if a water disposal area can be located.

The land capability classification is IIIw.

27A—Hatboro-Codorus complex, 0 to 2 percent slopes. This unit consists of very deep, nearly level soils on narrow to wide flood plains of creeks and rivers. These soils are commonly adjacent to the stream channel. The areas of these soils are commonly long, narrow, and winding. They range from 3 to 20 acres. These soils are subject to frequent flooding. The areas of the Hatboro and Codorus soils are so closely associated and are so intermingled or are so small that they could not be mapped separately. This unit is about 50 percent poorly drained Hatboro soils, 30 percent moderately well drained and somewhat poorly drained Codorus soils, and 20 percent other soils.

Typically, the surface layer of the Hatboro soils is dark brown silt loam 7 inches thick. The subsoil is 41 inches thick. The upper part of the subsoil is grayish brown silt loam, the middle part is light brownish gray silty clay loam, and the lower part is gray sandy clay loam. The substratum is gray stratified sandy sediments to a depth of 60 inches or more.

Typically, the surface layer of the Codorus soils is brown to dark brown silt loam 12 inches thick. The subsoil is dark yellowish brown loam 30 inches thick. The substratum is yellowish brown sandy loam to a depth of 60 inches or more.

Included with this unit in mapping are small areas, generally less than 2 acres each, of Comus and Elsinboro soils. Also included are small areas of soils that have a surface layer of loam, gravelly fine sandy loam, gravelly loam, cobbly fine sandy loam, or cobbly loam.

Major properties of the Hatboro soils—

Permeability: Surface layer—moderate; subsoil—moderate; substratum—moderately rapid
Available water capacity: Moderate
Surface runoff: Slow
Erosion hazard: Slight
Organic matter content: Low to moderate

Natural fertility: Medium
Soil reaction: Surface layer—very strongly acid to neutral; subsoil—very strongly acid to neutral; substratum—moderately acid or slightly acid
Depth of the root zone: 10 to 20 inches, restricted by wetness
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to the seasonal high water table: Surface to 6 inches, apparent
Flooding: Frequent

Major properties of the Codorus soils—

Permeability: Surface layer—moderate; subsoil—moderate; substratum—moderately rapid to rapid
Available water capacity: High
Surface runoff: Slow
Erosion hazard: Slight
Organic matter content: Moderate
Natural fertility: Medium
Soil reaction: Surface layer—very strongly acid to moderately acid; subsoil—strongly acid to slightly acid; substratum—strongly acid to slightly acid
Depth of the root zone: 10 to 30 inches, restricted by wetness
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to the seasonal high water table: 12 to 24 inches, apparent
Flooding: Frequent

Most of the acreage of these soils is woodland. The rest is in pasture and cultivated areas.

The Hatboro soils are poorly suited to cultivated crops, small grains, and alfalfa. The Codorus soils are well suited. The main limitations are frequent flooding and wetness in the spring, fall, and winter on the Hatboro soils. Artificial drainage is needed for row crops on the Hatboro soils.

This unit is well suited to grasses and moderately well suited to legumes. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Proper stocking rates, rotation grazing, deferred grazing, and use of lime and fertilizer are the main pasture management practices. Orchardgrass, Kentucky-31 fescue, red clover, and ladino clover are suitable species.

The potential productivity for northern red oak on these soils is moderately high. The estimated average annual production of wood per acre is 300 board-feet for the Hatboro soils and 450 board-feet for the Codorus soils. Tree seeds, cuttings, and seedlings of wet-tolerant species grow well if competing vegetation is controlled on the Hatboro soils. They survive and grow well on the Codorus soils. The water table restricts root penetration and thus makes trees on these soils susceptible to windthrow. The major limitations for planting and harvesting are wetness on the Hatboro soils and frequent flooding in the winter and spring on both soils. In some areas of the Hatboro soils, the wetness, flooding, and windthrow can be overcome by planting wet-tolerant species and harvesting during dry seasons. The frequent flooding on the Codorus soils is the major limitation for planting and harvesting.

This unit is very poorly suited to building site development and onsite waste disposal. The frequent flooding and the seasonal high water table are the major limitations. Subsurface drainage is suitable if a water disposal area can be located.

The land capability classification is IIIw.

28B—Haymarket silt loam, 2 to 7 percent slopes. This soil is very deep, gently sloping, and well drained and moderately well drained. It is on side slopes and ridgecrests. The areas are irregularly rounded or oblong and are convex to slightly concave. Drainageways are common. The areas range from approximately 2 to 25 acres.

Typically, the surface layer is dark brown silt loam 1 inch thick. The subsurface layer is light yellowish brown silt loam 8 inches thick. The subsoil is about 37 inches thick. The upper part of the subsoil is strong brown silt loam, the middle part is strong brown and yellowish red clay, and the lower part is strong brown silty clay loam. The substratum extends to a depth of 60 inches or more. It is multicolored saprolite that crushes to loam.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Jackland, Legore, Montalto, and Waxpool soils. A few areas are severely eroded and have a surface layer of clay loam or clay. Inclusions make up about 20 percent of the map unit.

Major soil properties—

Permeability: Surface layer moderate; subsoil—moderately slow; substratum—moderate
Available water capacity: Moderate
Surface runoff: Medium
Erosion hazard: Moderate
Organic matter content: Low to moderate
Natural fertility: Medium
Soil reaction: Surface layer and subsoil—very strongly acid to moderately acid; substratum—moderately acid to neutral

Depth of the root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most of the acreage of this soil is woodland. A few areas are in pasture, hay, and cultivated crops.

This soil is suitable for cultivated crops and small grains. The main limitation is erosion. Crops respond well to lime and fert lizer. Grasses and legumes and cover crops in the cropping system, conservation tillage, and crop residue in and on the soil help conserve moisture and control erosion.

This soil is well suited to grasses and legumes. The main pasture management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, and ladino clover are suited species.

The potential productivity for northern red oak on this soil is moderately h.gh. The estimated average annual production of wood per acre is 280 board-feet. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed.

This soil is suitable for building site development and onsite waste disposal. It does not have sufficient strength and stability to support vehicular traffic, but in places this limitation can be corrected by strengthening or replacing the base material. The permeability is a limitation for septic tank absorption fields, but in places this limitation can be overcome by increasing absorption area. The heaving of road surfaces after freezing in the winter is a limitation that can be overcome by replacing the base material. The high clay content makes this soil sticky and wet and difficult to spread on landfills. Mixing or replacing the clayey material improves the suitability for landfill cover.

The land capability classification is IIe.

28C—Haymarket silt loam, 7 to 15 percent slopes. This soil is very deep, strongly sloping, and well drained and moderately well drained. It is on side slopes. The areas are long and narrow and are convex to slightly concave. Drainageways are common. The areas range from approximately 2 to 25 acres.

Typically, the surface layer is dark brown silt loam 1 inch thick. The subsurface layer is light yellowish brown silt loam 8 inches thick. The subsoil is about 37 inches th ck. The upper part of the subsoil is strong brown silt loam, the middle part is strong brown and yellowish red clay, and the lower part is strong brown silty clay loam. The substratum extends to a depth of 60 inches or more. It is multicolored saprolite that crushes to loam.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Jackland, Legore, Montalto, and Waxpool soils. A few areas are severely eroded and have a surface layer of clay loam or clay. Inclusions make up about 20 percent of the map unit.

Major soil properties—

Permeability: Surface layer—moderate; subsoil—moderately slow; substratum—moderate
Available water capacity: Moderate
Surface runoff: Rapid
Erosion hazard: Severe
Organic matter content: Low to moderate
Natural fertility: Medium
Soil reaction: Surface layer and subsoil—very strongly acid to moderately acid; substratum—moderately acid to neutral
Depth of the root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most of the acreage of this soil is woodland. A few areas are in pasture, hay, and cultivated crops.

This soil is suitable for cultivated crops and small grains. The main limitation is erosion. Crops respond well to lime and fertilizer. Grasses and legumes and cover crops in the cropping system, conservation tillage, and crop residue in and on the soil help conserve moisture and control erosion.

This soil is well suited to grasses and legumes. The main pasture management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, and ladino clover are suited species.

The potential productivity for northern red oak on this soil is moderately high. The estimated average annual production of wood per acre is 280 board-feet. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed.

This soil is poorly suited to building site development and onsite waste disposal. It does not have sufficient strength and stability to support vehicular traffic, but in places this limitation can be corrected by strengthening or replacing the base material. The permeability is a limitation for septic tank absorption fields, but in places

this limitation can be overcome by increasing the absorption area. The heaving of road surfaces after freezing in the winter is a limitation that can be overcome by replacing the base material. The high clay content makes this soil sticky and wet and difficult to spread on landfills. Mixing or replacing the clayey material improves the suitability for landfill cover.

The land capability classification is IIIe.

29B—Hoadly loam, 2 to 7 percent slopes. This soil is very deep, gently sloping, and moderately well drained and somewhat poorly drained. It is on toe slopes, in saddles, and around the heads of drainageways. The areas are irregularly rounded or oblong. Slopes are mainly convex, but some are concave. The areas range from approximately 2 to 20 acres.

Typically, the surface layer is very dark grayish brown loam 2 inches thick. The subsurface layer is light yellowish brown loam 9 inches thick. The upper part of the subsoil is brownish yellow loam and clay 18 inches thick. The middle part is a firm dense layer, called a fragipan, of mottled, multicolored sandy clay loam 12 inches thick. The lower part is light gray to gray sandy clay 12 inches thick. The substratum is light gray to gray sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Buckhall, Meadowville and Occoquan soils. Also included are small areas with a thin fragipan or no fragipan. A few areas have a subsoil of clay loam or clay, a few have a surface layer of gravelly loam, and a few have slopes of up to 12 percent. Included soils make up about 20 percent of this map unit.

Major soil properties—

Permeability: Surface layer—moderate to moderately rapid; upper part of the subsoil—moderate; fragipan—very slow; substratum—moderate
Available water capacity: Low
Surface runoff: Medium
Erosion hazard: Moderate
Organic matter content: Low to moderate
Natural fertility: Medium
Soil reaction: Very strongly acid to slightly acid
Depth of the root zone: 15 to 30 inches, restricted by wetness
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to the seasonal high water table: 6 to 18 inches, perched
Flooding: None

Most of the acreage of this soil is woodland. The rest is in pasture and a few cultivated areas.

This soil is poorly suited to cultivated crops. The seasonal high water table and the shallow rooting depth are the main limitations. Wetness often interferes with farming operations. Subsurface drains and open ditches help to overcome the wetness.

This soil is well suited only to grasses and legumes that tolerate wet conditions. It is poorly suited to alfalfa. The main pasture management practices are weed control, use of lime and fertilizer, use of proper stocking rates, and controlled grazing. Kentucky-31 fescue, ladino clover, and other similar species are best suited.

The potential productivity for northern red oak on this soil is moderately high. The estimated average annual production of wood per acre is 280 board-feet. The mortality rate for tree seeds, cuttings, and seedlings is a hazard caused by wetness. The fragipan restricts root penetration and thus makes trees on this soil susceptible to windthrow. The main limitation for harvesting is wetness. The soil is soft when wet and does not support heavy equipment. In some areas wetness and windthrow can be overcome by planting wet-tolerant species and harvesting during dry seasons.

This soil is generally not suited to building site development or onsite waste disposal. The heaving of road surfaces, caused by frost action in the winter, and the seasonal high water table are limitations that in places can be overcome by strengthening or replacing the base material and by using drainage. The permeability and the seasonal high water table are limitations for septic tank absorption fields, sanitary landfills, and building sites. These limitations are generally difficult to overcome.

The land capability classification is IIIw.

30B—Jackland silt loam, 2 to 7 percent slopes. This soil is very deep, gently sloping, and moderately well drained and somewhat poorly drained. It is on upland ridgecrests and broad areas in the Triassic Region of the Piedmont Plateau. The areas are irregularly rounded to oblong. Slopes are convex but range to slightly concave. The areas range from about 2 to 50 acres.

Typically, the surface layer is yellowish brown silt loam 10 inches thick. The subsoil is 30 inches thick. The upper part of the subsoil is dark yellowish brown silt loam, the middle part is dark yellowish brown, mottled clay, and the lower part is yellowish brown and gray clay. The substratum is multicolored sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas,

generally less than 2 acres each, of Haymarket, Legore, Montalto, and Waxpool soils. Included soils make up approximately 20 percent of this map unit.

Major soil properties—

Permeability: Surface layer—moderate; subsoil—very slow; substratum—moderate
Available water capacity: Moderate
Surface runoff: Medium
Erosion hazard: Moderate
Organic matter content: Low
Natural fertility: Medium
Soil reaction: Surface layer and upper part of the subsoil—very strongly acid to moderately acid; lower part of the subsoil and the substratum—very strongly acid to mildly alkaline
Depth of the root zone: 20 to 30 inches, restricted by wetness
Depth to bedrock: More than 60 inches
Shrink-swell potential: Very high
Depth to the seasonal high water table: 12 to 24 inches, perched
Flooding: None

Most of the acreage of this soil is woodland. The rest is in pasture and a few cultivated areas.

This soil is poorly suited to cultivated crops. The seasonal high water table and the shallow rooting depth are the main limitations. Wetness often interferes with cultivation and harvest operations. Open-ditch drainage helps to overcome the wetness.

This soil is well suited only to grasses and legumes that tolerate wet conditions. It is poorly suited to alfalfa. The main pasture management practices are weed control, use of lime and fertilizer, open-ditch drainage, and controlled grazing. Kentucky-31 fescue, ladino clover, and other similar species are best suited.

The potential productivity for northern red oak on this soil is moderate. The estimated average annual production of wood per acre is 250 board-feet. The mortality rate for tree seeds, cuttings, and seedlings is a limitation because of wetness. The high water table restricts root penetration and thus makes trees on this soil susceptible to windthrow. The main limitation for harvesting is wetness. The soil is soft when wet and does not support heavy equipment. In some areas wetness and windthrow can be overcome by planting wet-tolerant species and harvesting during dry seasons.

This soil is generally not suited to building site development or onsite waste disposal. The heaving of road surfaces in winter and the seasonal high water table are limitations that can be overcome by replacing the subsoil layer and by drainage. The permeability and the seasonal high water table are limitations for septic tank absorption fields, sanitary landfills, and building sites. These limitations are generally difficult to overcome.

The land capability classification is IIe.

31B—Jackland-Haymarket complex, 2 to 7 percent slopes. These soils are very deep and gently sloping. They are on ridgecrests and broad areas. The areas of this unit are irregularly rounded to oblong and conform to the irregular contour of the landscape. Slopes are generally convex but range to concave. Shallow drainageways cross some areas. The areas of the unit range from 2 to 100 acres. The areas of the Jackland and Haymarket soils are so closely associated and so intermingled or are so small that they could not be mapped separately. This complex is about 50 percent moderately well drained and somewhat poorly drained Jackland soils, 30 percent well drained and moderately well drained Haymarket soils, and 20 percent other soils.

Typically, the surface layer of the Jackland soils is yellowish brown silt loam 10 inches thick. The subsoil is 30 inches thick. The upper part of the subsoil is dark yellowish brown silt loam, the middle part is dark yellowish brown, mottled clay, and the lower part is yellowish brown and gray clay. The substratum is multicolored sandy loam to a depth of 60 inches or more.

Typically, the surface layer of the Haymarket soils is dark brown loam 1 inch thick. The subsurface layer is light yellowish brown silt loam 8 inches thick. The subsoil is about 37 inches thick. The upper part of the subsoil is strong brown silt loam, the middle part is strong brown and yellowish red clay, and the lower part is strong brown silty clay loam. The substratum extends to a depth of 60 inches or more. It is multicolored, weathered diabase or basalt that crushes to loam.

Included with these soils in mapping are small areas, generally less than 2 acres each, of Legore, Montalto, and Waxpool soils.

Major properties of the Jackland soils—

Permeability: Surface layer—moderate; subsoil—very slow; substratum—moderate
Available water capacity: Moderate
Surface runoff: Medium
Erosion hazard: Moderate
Organic matter content: Low
Natural fertility: Medium
Soil reaction: Surface layer and upper part of the

subsoil—very strongly acid to moderately acid; lower part of the subsoil and the substratum—very strongly acid to mildly alkaline
Depth of the root zone: 20 to 30 inches, restricted by wetness
Depth to bedrock: More than 60 inches
Shrink-swell potential: Very high
Depth to the seasonal high water table: 12 to 24 inches, perched
Flooding: None

Major properties of the Haymarket soils—

Permeability: Surface layer—moderate; subsoil—moderately slow; substratum—moderate
Available water capacity: Moderate
Surface runoff: Slow to medium
Erosion hazard: Moderate
Organic matter content: Low to moderate
Natural fertility: Medium
Soil reaction: Surface layer and upper part of the subsoil—very strongly acid to moderately acid; lower part of the subsoil and the substratum—moderately acid to neutral
Depth of the root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most of the acreage of this soil is woodland. The rest is in pasture and a few cultivated areas.

The Jackland soils in this map unit are poorly suited to cultivated crops. The seasonal high water table and the shallow rooting depth are the main limitations. Wetness in the Jackland soils often interferes with cultivation and harvest operations in spring, winter, and fall. Open-ditch drainage helps to overcome the wetness. The Haymarket soils are moderately well suited to most cultivated crops and small grains grown in the county.

The Jackland soils are well suited only to grasses and legumes that tolerate wet conditions. They are poorly suited to alfalfa. The Haymarket soils are well suited to grasses and legumes and moderately well suited to alfalfa. The main pasture management practices are weed control, use of lime and fertilizer, and controlled grazing. Kentucky-31 fescue, ladino clover, and other similar species are best suited.

The potential productivity for northern red oak on the Jackland soils is moderate, and the estimated average annual production of wood per acre is 250 board-feet. The potential productivity of the Haymarket soils is moderately high, and the estimated average annual production of wood per acre is 280 board-feet. The mortality rate for tree seeds, cuttings, and seedlings is a limitation caused by wetness in the Jackland soils. The high water table restricts root penetration and thus makes trees on these soils susceptible to windthrow. The main limitation for harvesting is wetness in the Jackland soils. The soil is soft when wet and does not support heavy equipment. In some areas wetness and windthrow can be overcome by planting wet-tolerant species and harvesting during dry seasons on the Jackland soils.

This map unit is generally not suited to building site development or onsite waste disposal. The heaving of road surfaces, caused by frost action in the winter, insufficient strength and stability to support vehicular traffic, and the seasonal high water table in the Jackland soils are limitations that in places can be overcome by replacing the subsoil material and using drainage. The permeability, the shrink-swell potential, and the seasonal high water table in the Jackland soils and the permeability in the Haymarket soils are limitations for septic tank absorption fields, sanitary landfills, and building sites. The clay in the Haymarket soils makes them difficult to spread on landfills. Replacing the clayey material helps to overcome this limitation.

The land capability classification is IIe.

31C—Jackland-Haymarket complex, 7 to 15 percent slopes. These soils are very deep and strongly sloping. The areas of this unit are irregularly rounded to oblong and conform to the irregular contour of the landscape. Slopes are generally convex but range to concave. Shallow drainageways cross some areas. The areas of the unit range from 2 to 100 acres. The areas of the Jackland and Haymarket soils are so closely associated and so intermingled or are so small that they could not be mapped separately. This complex is about 50 percent moderately well drained and somewhat poorly drained Jackland soils, 30 percent well drained and moderately well drained Haymarket soils, and 20 percent other soils.

Typically, the surface layer of the Jackland soils is yellowish brown silt loam 10 inches thick. The subsoil is 30 inches thick. The upper part of the subsoil is dark yellowish brown silt loam, the middle part is dark yellowish brown, mottled clay, and the lower part is yellowish brown and gray clay. The substratum is multicolored sandy loam to a depth of 60 inches or more.

Typically, the surface layer of the Haymarket soils is dark brown loam 1 inch thick. The subsurface layer is light yellowish brown silt loam 8 inches thick. The subsoil is about 37 inches thick. The upper part of the subsoil is strong brown silt loam, the middle part is strong brown and yellowish red clay, and the lower part is strong brown silty clay loam. The substratum extends to a depth of 60 inches or more. It is multicolored, weathered diabase or basalt that crushes to loam.

Included with these soils in mapping are small areas, generally less than 2 acres each, of Legore, Montalto, and Waxpool soils.

Major properties of the Jackland soils—

Permeability: Surface layer—moderate; subsoil—very slow; substratum—moderate
Available water capacity: Moderate
Surface runoff: Medium
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Medium
Soil reaction: Surface layer and upper part of the subsoil—very strongly acid to moderately acid; lower part of the subsoil and the substratum—very strongly acid to mildly alkaline
Depth of the root zone: 20 to 30 inches, restricted by wetness
Depth to bedrock: More than 60 inches
Shrink-swell potential: Very high
Depth to the seasonal high water table: 12 to 24 inches, perched
Flooding: None

Major properties of the Haymarket soils—

Permeability: Surface layer—moderate; subsoil - moderately slow; substratum—moderate
Available water capacity: Moderate
Surface runoff: Medium
Erosion hazard: Severe
Organic matter content: Low to moderate
Natural fertility: Medium
Soil reaction: Surface layer and upper part of the subsoil—very strongly acid to moderately acid; lower part of the subsoil and the substratum—moderately acid to neutral
Depth of the root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most of the acreage of this soil is woodland. The rest is in pasture and a few cultivated areas.

The Jackland soils in this unit are poorly suited to cultivated crops. The seasonal high water table and the shallow rooting depth are the main limitations. Wetness in the Jackland soils often interferes with cultivation and harvest operations in spring, winter, and fall. Open-ditch drainage helps to overcome the wetness. The Haymarket soils are moderately well suited to most cultivated crops and small grains grown in the county if cover crops, grasses and legumes, and conservation tillage are used to control erosion.

The Jackland soils are well suited only to grasses and legumes that tolerate wet conditions. They are poorly suited to alfalfa. The Haymarket soils are well suited to grasses and legumes and moderately well suited to alfalfa. The main pasture management practices are weed control, use of lime and fertilizer, and controlled grazing. Kentucky-31 fescue, ladino clover, and other similar species are best suited.

The potential productivity for northern red oak on the Jackland soils is moderate, and the estimated average annual production of wood per acre is 250 board-feet. The potential productivity of the Haymarket soils is moderately high, and the estimated average annual production of wood per acre is 280 board-feet. The mortality rate for tree seeds, cuttings, and seedlings is a limitation caused by wetness in the Jackland soils. The high water table restricts root penetration and thus makes trees on these soils susceptible to windthrow. The main limitation for harvesting is wetness in the Jackland soils. The soil is soft when wet and does not support heavy equipment. In some areas wetness and windthrow can be overcome by planting wet-tolerant species and harvesting during dry seasons on the Jackland soils.

This map unit is generally not suited to building site development or onsite waste disposal. The heaving of road surfaces, caused by frost action in the winter, insufficient strength and stability to support vehicular traffic, and the seasonal high water table in the Jackland soils are limitations that in places can be overcome by replacing the subsoil material and using drainage. The permeability, the shrink-swell potential, and the seasonal high water table in the Jackland soils and the permeability in the Haymarket soils are limitations for septic tank absorption fields, sanitary landfills, and building sites. The clay in the Haymarket soils makes them difficult to spread on landfills. Replacing the clayey material helps to overcome this limitation.

The land capability classification is IIIe.

32A—Kelly silt loam, 0 to 2 percent slopes. This soil is deep, level to nearly level, and somewhat poorly drained. It is on upland flats. Slopes are slightly convex to slightly concave. The areas are irregularly rounded to long and narrow and range from approximately 2 to 20 acres.

Typically, the surface layer is very dark grayish brown silt loam 1 inch thick. The subsurface layer is brown silt loam 8 inches thick. The subsoil layer is 32 inches thick. The upper part of the subsoil is light olive brown silty clay loam; the middle part is mottled, very dark grayish brown and dark gray and very dark gray clay; and the lower part is mottled, dark brown, dark gray, black, and light brownish gray gravelly silty clay. The substratum is very dark grayish brown partially weathered hornfels 4 inches thick. Bedrock is at a depth of 45 inches.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Catlett, Sycoline, and Waxpool soils. Included soils make up about 20 percent of this map unit.

Major soil properties—

Permeability: Surface layer—moderate; subsoil—slow to very slow; substratum—slow
Available water capacity: Moderate
Surface runoff: Slow
Erosion hazard: Slight
Organic matter content: Low
Natural fertility: Low to medium
Soil reaction: Surface layer—very strongly acid to moderately acid; subsoil and substratum—slightly acid or neutral
Depth of the root zone: 20 to 36 inches, restricted by wetness
Depth to bedrock: 40 to 60 inches, hard
Shrink-swell potential: High
Depth to the seasonal high water table: 18 to 30 inches, apparent
Flooding: None

Most areas of this soil are woodland. A few areas are in pasture.

This soil is poorly suited to cultivated crops and small grains. The main limitation is wetness in spring, fall, and winter. Artificial drainage is needed for row crops.

This unit is moderately well suited to grasses and legumes that tolerate wet conditions. It is poorly suited to alfalfa. The main management practices are use of drainage, use of lime and fertilizer, weed control, and controlled grazing. Kentucky-31 fescue, ladino clover, and similar wet-tolerant species are best suited.

The potential productivity for northern red oak on this soil is moderate. The estimated average annual production of wood per acre is 250 board-feet. Tree seeds, cuttings, and seedlings have a high rate of mortality because of wetness. Planting trees that tolerate wetness helps to overcome this limitation. The soil is soft when wet and does not support heavy harvesting equipment. Harvesting during dry seasons helps reduce rutting by heavy equipment.

This soil is poorly suited to building site development and onsite waste disposal. The seasonal high water table and low strength limit this soil for building site development. The seasonal high water table and bedrock limit the soil for onsite waste disposal. Subsurface drainage can be used if water disposal areas can be located. The seasonal high water table and the permeability in the subsoil are limitations for septic tank absorption fields.

The land capability classification is IVw.

33B—Legore-Oakhill complex, 2 to 7 percent slopes. This unit consists of well drained, gently sloping soils on ridgecrests and side slopes. The areas are irregularly rounded to oblong, and shallow drainageways cross the areas at common intervals. Slopes are commonly convex to slightly concave. The areas range from approximately 2 to 40 acres. The areas of Legore and Oakhill soils are so closely associated and are so intermingled or so small that they could not be mapped separately. This complex is about 50 percent very deep Legore soils, 30 percent moderately deep Oakhill soils, and 20 percent other soils.

Typically, the surface layer of the Legore soils is brown loam 6 inches thick. The subsoil is 22 inches thick. It is strong brown loam in the upper part and yellowish red sandy clay loam in the lower part. The substratum is multicolored sandy loam to a depth of 60 inches or more.

Typically, the surface layer of the Oakhill soils is dark brown gravelly silt loam 8 inches thick. The subsoil is strong brown very gravelly loam 17 inches thick. The substratum is 20 inches thick. It is variegated very gravelly sandy loam in the upper part and olive yellow partially weathered basalt in the lower part. Bedrock is at a depth of 45 inches.

Included with this unit in mapping are small areas, generally less than 2 acres each, of Haymarket, Jackland, Montalto, and Waxpool soils. Also included are a few severely eroded areas that have a surface layer of silty clay loam.

Major properties of the Legore soils—

Permeability: Surface layer—moderate through moderately rapid; subsoil—moderate; substratum—moderate through moderately rapid
Available water capacity: Moderate
Surface runoff: Medium
Erosion hazard: Moderate
Organic matter content: Low
Natural fertility: Low to medium
Soil reaction: Surface layer—strongly acid or moderately acid; subsoil—moderately acid or slightly acid; substratum—moderately acid or slightly acid
Depth of the root zone: More than 60 inches
Shrink-swell potential: Moderate
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Major properties of the Oakhill soils—

Permeability: Surface layer—moderately rapid; subsoil—moderate; substratum—moderate
Available water capacity: Low
Surface runoff: Medium
Erosion hazard: Moderate
Organic matter content: Low
Natural fertility: Low to medium
Soil reaction: Surface layer—very strongly acid or strongly acid; subsoil—moderately acid through neutral; substratum—moderately acid through neutral
Depth of the root zone: 20 to 40 inches, restricted to rock
Depth to bedrock: 20 to 40 inches, soft
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most of the acreage of this unit is woodland. The rest is in cultivated crops and a few areas of pasture or hay.

This unit is suited to cultivated crops and small grains. The main limitations are erosion and droughtiness in the Oakhill soils. Crops respond well to lime and fertilizer. Cover crops, conservation tillage, and crop residue in and on the soil help conserve moisture and control erosion. This unit is suited to corn, soybeans, wheat, and oats.

This unit is well suited to grasses and legumes. The main pasture management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, ladino clover, and alfalfa are suitable species.

The potential productivity for northern red oak on these soils is moderately high. The estimated average annual production of wood per acre is 290 board-feet. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed.

The Legore soils are suitable for building site development and for most onsite waste disposal systems. The Oakhill soils are poorly suited to building site development and most onsite waste disposal systems. The depth to rock in the Oakhill soils is the main limitation. Insufficient strength and stability to support vehicular traffic and heaving of road surfaces, caused by frost action in the winter, are limitations in both soils that in places can be overcome by replacing the base material. Sealing the bottom of sewage lagoons in the Legore soils helps prevent seepage.

The land capability classification is IIe.

33C—Legore-Oakhill complex, 7 to 15 percent slopes. This unit consists of well drained, strongly sloping soils on ridgecrests and side slopes. The areas are irregularly rounded to oblong, and shallow drainageways cross the areas at common intervals. Slopes are commonly convex to slightly concave. The areas range from approximately 2 to 40 acres. The areas of Legore and Oakhill soils are so closely associated and are so intermingled or so small that they could not be mapped separately. This complex is about 50 percent very deep Legore soils, 30 percent moderately deep Oakhill soils, and 20 percent other soils.

Typically, the surface layer of the Legore soils is brown loam 6 inches thick. The subsoil is 22 inches thick. It is strong brown loam in the upper part and yellowish red sandy clay loam in the lower part. The substratum is multicolored sandy loam to a depth of 60 inches or more.

Typically, the surface layer of the Oakhill soils is dark brown gravelly silt loam 8 inches thick. The subsoil is strong brown very gravelly loam 17 inches thick. The substratum is 20 inches thick. It is variegated very gravelly sandy loam in the upper part and olive yellow partially weathered basalt in the lower part. Bedrock is at a depth of 45 inches.

Included with this unit in mapping are small areas, generally less than 2 acres each, of Haymarket, Jackland, Montalto, and Waxpool soils. Also included are a few severely eroded areas that have a surface layer of silty clay loam.

Major properties of the Legore soils—

Permeability: Surface layer—moderate through moderately rapid; subsoil—moderate; substratum—moderate through moderately rapid
Available water capacity: Moderate
Surface runoff: Medium
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low to medium
Soil reaction: Surface layer—strongly acid or moderately acid; subsoil—moderately acid or slightly acid; substratum—moderately acid or slightly acid
Depth of the root zone: More than 60 inches
Shrink-swell potential: Moderate
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Major properties of the Oakhill soils—

Permeability: Surface layer—moderately rapid; subsoil—moderate; substratum—moderate
Available water capacity: Low
Surface runoff: Medium
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low to medium
Soil reaction: Surface layer—very strongly acid or strongly acid; subsoil—moderately acid through neutral; substratum—moderately acid through neutral
Depth of the root zone: 20 to 40 inches, restricted to rock
Depth to bedrock: 20 to 40 inches, soft
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most of the acreage of this unit is woodland. The rest is in cultivated crops and a few areas of pasture or hay.

This unit is suited to cultivated crops and small grains. The main limitations are erosion and droughtiness in the Oakhill soils. Crops respond well to lime and fertilizer. Cover crops, conservation tillage, and crop residue in and on the soil help conserve moisture and control erosion. This unit is suited to corn, soybeans, wheat, and oats.

This unit is well suited to grasses and legumes. The main pasture management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, ladino clover, and alfalfa are suitable species.

The potential productivity for northern red oak on these soils is moderately high. The estimated average annual production of wood per acre is 290 board-feet. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed.

The Legore soils are suitable for building site development and most onsite waste disposal systems. The Oakhill soils are poorly suited to building site development and most onsite waste disposal systems. The depth to rock in the Oakhill soils is the main limitation. Insufficient strength and stability to support vehicular traffic and heaving of road surfaces, caused by frost action in the winter, are limitations in both soils that in places can be overcome by replacing the base material. Sealing the bottom of sewage lagoons in the Legore soils helps prevent seepage.

The land capability classification is IIIe.

33D—Legore-Oakhill complex, 15 to 25 percent slopes. This unit consists of well drained, moderately steep soils on ridgecrests and side slopes. The areas are irregularly rounded to oblong, and shallow drainageways cross the areas at common intervals. Slopes are commonly convex to slightly concave. The areas range from approximately 2 to 40 acres. The areas of Legore and Oakhill soils are so closely associated and are so intermingled or so small that they could not be mapped separately. This complex is about 50 percent very deep Legore soils, 30 percent moderately deep Oakhill soils, and 20 percent other soils.

Typically, the surface layer of the Legore soils is brown loam 6 inches thick. The subsoil is 22 inches thick. It is strong brown loam in the upper part and yellowish red sandy clay loam in the lower part. The substratum is multicolored sandy loam to a depth of 60 inches or more.

Typically, the surface layer of the Oakhill soils is dark brown gravelly silt loam 8 inches thick. The subsoil is strong brown very gravelly loam 17 inches thick. The substratum is 20 inches thick. It is variegated very gravelly sandy loam in the upper part and olive yellow partially weathered basalt in the lower part. Bedrock is at a depth of 45 inches.

Included with this unit in mapping are small areas, generally less than 2 acres each, of Haymarket, Jackland, Montalto, and Waxpool soils. Also included are a few severely eroded areas that have a surface layer of silty clay loam.

Major properties of the Legore soils—

Permeability: Surface layer—moderate through moderately rapid; subsoil—moderate; substratum—moderate through moderately rapid
Available water capacity: Moderate
Surface runoff: Rapid
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low to medium
Soil reaction: Surface layer—strongly acid or moderately acid; subsoil—moderately acid or slightly acid; substratum—moderately acid or slightly acid
Depth of the root zone: More than 60 inches
Shrink-swell potential: Moderate
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Major properties of the Oakhill soils—

Permeability: Surface layer—moderately rapid; subsoil—moderate; substratum—moderate
Available water capacity: Low
Surface runoff: Medium
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low to medium
Soil reaction: Surface layer—very strongly acid or strongly acid; subsoil—moderately acid through neutral; substratum—moderately acid through neutral
Depth of the root zone: 20 to 40 inches, restricted to rock
Depth to bedrock: 20 to 40 inches, soft
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most of the acreage of this unit is woodland. A small acreage is in pasture or hay.

This unit is poorly suited to cultivated crops and small grains. The main limitations are slope, erosion, and droughtiness in the Oakhill soils. Crops respond well to lime and fertilizer. Cover crops, conservation tillage, and crop residue in and on the soil help conserve moisture and control erosion.

This unit is suited to grasses and legumes. The main pasture management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, ladino clover, and alfalfa are suitable species.

The potential productivity for northern red oak on these soils is moderately high on north-facing slopes and moderate on south-facing slopes. The estimated average annual production of wood per acre is 290 board-feet on north-facing slopes and 250 board-feet on south facing slopes. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed.

These soils are poorly suited to building site development and most onsite waste disposal systems. The depth to rock in the Oakhill soils and the slope are the main limitations.

The land capability classification is IVe.

34B—Lunt loam, 2 to 7 percent slopes. This soil is very deep, gently sloping, and well drained and moderately well drained. It is on narrow to medium-wide ridges. The areas are irregularly rounded or oblong. Slopes are generally convex, but swales cross the areas at common intervals. The areas range from about 2 to 30 acres.

Typically, the surface layer is very dark grayish brown and dark brown loam 7 inches thick. The subsoil is 32 inches thick. It is strong brown clay in the upper part and strong brown clay loam in the lower part. The substratum is yellowish brown and very pale brown sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are areas, generally less than 2 acres each, of Marumsco and Quantico soils. Also included are small areas with a surface layer of gravelly loam, a few eroded areas that have a surface layer of clay loam or clay, and a few areas underlain by gray marine silt and clay. Included soils make up about 20 percent of this map unit.

Major soil properties—

Permeability: Surface layer—moderate to moderately rapid; subsoil—moderate to moderately rapid; substratum—moderate through very slow
Available water capacity: Moderate
Surface runoff: Medium
Erosion hazard: Moderate
Organic matter content: Low
Natural fertility: Medium
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: More than 60 inches
Shrink-swell potential: High
Depth to the seasonal high water table: More than 72 inches

Flooding: None

Most of the acreage of this soil is woodland; the rest is used for cultivated crops, hay, and pasture. This soil is classified as prime farmland.

This soil is well suited to cultivated crops. The main limitations are erosion and slope. Good seedbed preparations are difficult on the severely eroded inclusions. Cover crops and grasses and legumes in the cropping system, conservation tillage, and crop residue in and on the soil help conserve moisture and control erosion. Corn, soybeans, wheat, and oats are commonly grown.

This soil is well suited to grasses and legumes. The main pasture management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, ladino clover, and alfalfa are suitable species.

The potential productivity for northern red oak on this soil is moderately high. The estimated average annual production of wood per acre is 300 board-feet. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed. Seasonal wetness is the major limitation for planting and harvesting trees.

This soil is suitable for building site development and onsite waste disposal. It does not have sufficient strength and stability to support vehicular traffic, but this in places can be overcome by strengthening or replacing the base material. Reinforcing the footings of basements helps to prevent damage caused by the shrink-swell potential. The permeability is a limitation for septic tank absorption fields. In some areas this can be overcome by installing the leach field in the more permeable substratum. Sealing the bottom of sewage lagoons helps prevent seepage. The high clay content makes this soil difficult to spread on landfills. Mixing or replacing the clayey subsoil material increases the suitability of the soil as cover for landfills.

The land capability classification is IIe.

34C—Lunt loam, 7 to 15 percent slopes. This soil is very deep, strongly sloping, and well drained and moderately well drained. It is on narrow to medium-wide ridges. The areas are irregularly rounded or oblong. Slopes are generally convex, but swales cross the areas at common intervals. The areas range from about 2 to 30 acres.

Typically, the surface layer is very dark grayish brown and dark brown loam 7 inches thick. The subsoil is 32 inches thick. It is strong brown clay in the upper part and strong brown clay loam in the lower part. The substratum is yellowish brown and very pale brown sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Marumsco and Quantico soils. Also included are small areas with a surface layer of gravelly loam, a few eroded areas that have a surface layer of clay loam or clay, and a few areas underlain by gray marine silt and clay. Included soils make up about 20 percent of this map unit.

Major soil properties—

Permeability: Surface layer—moderate to moderately rapid; subsoil—moderate to moderately rapid; substratum—moderate through very slow
Available water capacity: Moderate
Surface runoff: Medium
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Medium
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: More than 60 inches
Shrink-swell potential: High
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most of the acreage of this soil is woodland. A few small areas are used for cultivated crops, hay, and pasture.

This soil is moderately well suited and poorly suited to cultivated crops. The main limitations are erosion, the clay content, and slope. Good seedbed preparations are difficult on the severely eroded inclusions. Cover crops and grasses and legumes in the cropping system, conservation tillage, and crop residue in and on the soil help conserve moisture and control erosion. Corn, soybeans, wheat, and oats are commonly grown.

This soil is well suited to grasses and legumes. The main pasture management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, and ladino clover are suitable species.

The potential productivity for northern red oak on this soil is moderately high. The estimated average annual production of wood per acre is 300 board-feet. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed. Seasonal wetness is the major limitation for planting and harvesting trees.

This soil is suitable for building site development and

onsite waste d sposal. It does not have sufficient strength and stability to support vehicular traffic, but in places this limitation can be overcome by strengthening or replacing tne base material. Reinforcing the footings of basements helps to prevent damage caused by the shrink-swell potential. The permeability is a limitation for septic tank absorption fields. In some areas this can be overcome by installing the leach field in the more permeable substratum. Sealing the bottom of sewage lagoons helps prevent seepage. The high clay content makes this soil difficult to spread on landfills. Mixing or replacing tne clayey subsoil material increases the suitability of the soil as cover for landfills.

The land capability classification is IVe.

34D—Lunt loam, 15 to 25 percent slopes. This soil is very deep, moderately steep, and well drained and moderately well drained. It is on narrow to medium-wide side slopes. The areas are long and narrow to oblong. Slopes are generally convex, but swales cross the areas at common intervals. The areas range from about 2 to 30 acres.

Typically, the surface layer is very dark grayish brown and dark brown loam 7 inches thick. The subsoil is 32 inches thick. It is strong brown clay in the upper part and strong brown clay loam in the lower part. The substratum is yellowish brown and very pale brown sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Marumsco and Quantico soils. Also included are small areas with a surface layer of gravelly loam, a few eroded areas that have a surface layer of clay loam or clay, and a few areas underlain by gray marine silt and clay. Included soils make up about 25 percent of this map unit.

Ma,or soil properties—

Permeability: Surface layer—moderate to moderately rapid; subsoil—moderate to moderately rapid; substratum—moderate through very slow
Available water capacity: Moderate
Surface runoff. Medium to rapid
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Medium
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone. More than 60 inches
Shrink-swell potential: High
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most of the acreage of this soil is woodland. A few small areas are used for cultivated crops, hay, and pasture.

This soil is poorly suited to cultivated crops. The main limitations are erosion and slope. Good seedbed preparations are difficult on the severely eroded inclusions. Cover crops and grasses and legumes in the cropping system, conservation tillage, and crop residue in and on the soil help conserve moisture and control erosion.

This soil is suited to grasses and legumes. The main pasture management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, and ladino clover are suitable species.

The potential productivity for northern red oak on this soil is moderately high on north-facing slopes and moderate on south-facing slopes. The estimated average annual production of wood per acre is 300 board-feet on north-facing slopes and 270 board feet on south-facing slopes. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed. Seasonal wetness is the major limitation for planting and harvesting trees. Protecting skid trails helps to prevent erosion.

This soil is poorly suited to building site development and onsite waste disposal. Slope is the major limitation. The soil does not have sufficient strength and stability to support vehicular traffic, but in places this limitation can be overcome by strengthening or replacing the base material. Reinforcing the footings of basements helps to prevent damage caused by the shrink-swell potential. The permeability is a limitation for septic tank absorption fields. In some areas this can be overcome by installing the leaching field in the more permeable substratum. Sealing the bottom of sewage lagoons helps prevent seepage. The high clay content makes this soil difficult to spread on landfills. Mixing or replacing the clayey subsoil material increases the suitability of the soil as cover for landfills.

The land capability classification is VIe.

35B—Manassas silt loam, 2 to 7 percent slopes. This soil is very deep, gently sloping, and well drained and moderately well drained. It is in concave to slightly convex areas in depressions, on toe slopes, in saddle positions, and at heads of and along drainageways. The soil is subject to flooding for brief periods during heavy rainstorms. The areas range from 10 to 100 acres.

Typically, the surface layer is brown silt loam 10

Figure 2.—Cut hay on Manassas silt loam, 2 to 7 percent slopes.

inches thick. The subsoil is 33 inches thick. The upper part of the subsoil is strong brown silt loam, the middle part is reddish brown clay loam, and the lower part is dark reddish brown silty clay loam. The substratum extends to a depth of 60 inches or more. It is dark reddish brown channery sandy loam to a depth of 49 inches and is partially weathered red siltstone or sandstone below that.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Albano, Arcola, Panorama, and Reaville soils. Included soils make up about 15 percent of the map unit.

Major soil properties—

Permeability: Moderate to moderately rapid throughout
Available water capacity: Moderate
Surface runoff: Slow to medium
Erosion hazard: Moderate
Organic matter content: Low to moderate
Natural fertility: Low to medium
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: 40 to 60 inches, restricted in places by wetness
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to the seasonal high water table: 24 to 36 inches, apparent
Flooding: Rare

Most areas of this soil are in cultivated crops. A few areas are in hay or woodland (fig. 2). This soil is classified as prime farmland.

This soil is well suited to cultivated crops. The seasonal high water table in some areas interferes with seedbed preparation, cultivation, and harvesting. The main management concerns are providing drainage and lime and fertilizer. Conservation tillage, cover crops, crop residue in and on the soil, and grasses and legumes in the cropping system increase organic matter content and maintain the tilth of the soil. Corn, soybeans, and small grains are suitable crops.

This soil is well suited to grasses and legumes. It is poorly suited to alfalfa. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Proper stocking rates, rotation grazing, deferred grazing, and use of lime and fertilizer are the main pasture management practices. Orchardgrass, Kentucky-31 fescue, red clover, and ladino clover are suitable species.

The potential productivity for northern red oak on this soil is moderately high. The estimated average annual production of wood per acre is 300 board-feet. Tree seeds, cuttings, and seedlings survive and do well on this soil. Seasonal wetness is the major limitation for planting and harvesting.

This soil is poorly suited to building site development and onsite waste disposal. Flooding and the seasonal high water table are the main limitations for building site development. Subsurface drainage and diversion of surface water helps to overcome those limitations. Sealing the bottom of sewage lagoons helps prevent seepage.

The land capability classification is IIe

36D—Marr very fine sandy loam, 7 to 25 percent slopes. This soil is very deep, strongly sloping and moderately steep, and well drained. It is on side slopes. The areas are generally long and winding. Slopes are commonly convex but range to slightly concave in a few places. Shallow drainageways cross the areas at common intervals. The areas range from 2 to 20 acres.

Typically, the surface layer is dark grayish brown very fine sandy loam 2 inches thick. The subsurface layer is light yellowish brown very fine sandy loam 11 inches thick. The subsoil is about 40 inches thick. It is yellowish brown, yellowish red, and strong brown sandy clay loam. The substratum is strong brown sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Lunt, Neabsco, and Quantico soils. Also included are a few areas that have a red subsoil, more clay, or a surface layer of gravelly very fine sandy loam. Some small areas have ironstone layers in the subsoil and substratum. Included areas make up 20 percent of this unit.

Major soil properties—

Permeability: Surface layer—moderately rapid; subsoil—moderate; substratum—moderately rapid
Available water capacity: Moderate
Surface runoff: Rapid
Erosion hazard: Severe
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Surface layer—strongly acid; subsoil and substratum—very strongly acid or strongly acid
Depth of the root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most of the acreage of this soil is woodland. A few areas are in pasture.

This soil is poorly suited to cultivated crops. Slopes, erosion, and the low fertility are the main limitations. If the soil is used for cultivated crops, there is a severe hazard of further erosion and long rotations with grasses and legumes are needed.

This soil is moderately well suited to grasses, hay, and legumes. Slope and low fertility are the main limitations. Use of lime and fertilizer, weed control, and controlled grazing are the main pasture management practices. Kentucky-31 fescue, ladino clover, and other similar species are suitable.

The potential productivity for northern red oak on this soil is moderately high. The estimated average annual production of wood per acre is 280 board-feet. Tree seeds, cuttings, and seedlings survive and grow well. Slope is the main limitation for planting and harvesting. Erosion is a hazard on unprotected skid trails that are up and down the slope instead of on the contour.

The areas of this soil that have of slopes less than 15 percent are suitable for building site development and for most onsite waste disposal systems. The permeability is a limitation for septic tank absorption fields, but this can be overcome by installing drainage lines in the substratum. Sealing the bottom of landfills helps prevent seepage. The areas with slopes of more than 15 percent generally require special design.

The land capability classification is VIe.

36E—Marr very fine sandy loam, 25 to 50 percent slopes. This soil is very deep, steep, and well drained.

It is on side slopes. The areas are generally long and winding. Slopes are commonly convex but range to slightly concave in a few places. Shallow drainageways cross the areas at common intervals. The areas range from 2 to 40 acres.

Typically, the surface layer is dark grayish brown very fine sandy loam 2 inches thick. The subsurface layer is light yellowish brown very fine sandy loam 11 inches thick. The subsoil is about 40 inches thick. It is yellowish brown, yellowish red, and strong brown sandy clay loam. The substratum is strong brown sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Lunt, Neabsco, and Quantico soils. Also included are a few areas that have a red subsoil, more clay, or a surface layer of gravelly very fine sandy loam. Some small areas have ironstone layers in the subsoil and substratum. Included areas make up 20 percent of this unit.

Major soil properties—

Permeability: Surface layer—moderately rapid; subsoil—moderate; substratum—moderately rapid
Available water capacity: Moderate
Surface runoff: Very rapid
Erosion hazard: Severe
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Surface layer—strongly acid; subsoil and substratum—very strongly acid or strongly acid
Depth of the root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most of the acreage of this soil is woodland.

This soil is generally unsuited to cultivated crops. Slopes, erosion, and the low fertility are the main limitations. If the soil is used for cultivated crops, there is a severe hazard of further erosion.

This soil is poorly suited to grasses, hay, and legumes. Slope and low fertility are the main limitations. Use of lime and fertilizer, weed control, and controlled grazing are the main pasture management practices. Kentucky-31 fescue, ladino clover, and other similar species are common.

The potential productivity for northern red oak on this soil is moderately high. The estimated average annual production of wood per acre is 280 board-feet. Tree seeds, cuttings, and seedlings survive and grow well. Slope is the main limitation for planting and harvesting. Erosion is a hazard on unprotected skid trails that are up and down the slope instead of on the contour.

This soil is generally unsuitable for building site development and for most onsite waste disposal systems. Slope is the major limitation.

The land capability classification is VIIe.

37A—Marumsco loam, 0 to 4 percent slopes. This soil is very deep, nearly level and gently sloping, and moderately well drained and somewhat poorly drained. The areas are irregularly rounded or oblong. Slopes range from slightly convex to slightly concave. The areas range from about 2 to 20 acres.

Typically, the surface layer is very dark grayish brown loam 1 inch thick. The subsurface layer is pale brown loam 6 inches thick. The subsoil is 40 inches thick. The upper part of the subsoil is brownish yellow clay loam, the middle part is brownish yellow clay, and the lower part is gray sandy clay loam. The substratum is light gray sandy clay loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Lunt and Quantico soils. Also included are small areas that are sandier in the subsoil, a few areas that have a surface layer of gravelly loam, and a few small, depressional areas that are ponded for short periods after heavy rains. Included soils make up about 15 percent of this map unit.

Major soil properties—

Permeability: Surface layer—moderately slow; subsoil—slow; substratum—moderate
Available water capacity: Moderate
Surface runoff: Slow
Erosion hazard: Slight
Organic matter content: Low
Natural fertility: Low to medium
Soil reaction: Extremely acid or very strongly acid
Depth of the root zone: 18 to 36 inches, restricted by wetness
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to the seasonal high water table: 12 to 18 inches, apparent
Flooding: None

Most of the acreage of this soil is woodland. The rest is cultivated or in pasture.

This soil is moderately well suited to cultivated crops and small grains. It is poorly suited to alfalfa. The main limitation is wetness in spring, fall, and winter, and

subsurface drainage is used in some areas. Wetness often interferes with cultivation and harvest operations in spring, winter, and fall.

This soil is well suited only to grasses and legumes that tolerate wet conditions. The main pasture management practices are weed control, use of lime and fertilizer, and controlled grazing. Kentucky-31 fescue, ladino clover, and other similar species are best suited.

The potential productivity for northern red oak on this soil is moderately high. The estimated average annual production of wood per acre is 300 board-feet. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed. The main limitation for harvesting is wetness. The soil is soft when wet and does not support heavy equipment. In some areas wetness can be overcome by planting wet-tolerant species and harvesting during dry seasons.

This soil is generally not suited to building site development or onsite waste disposal. The heaving of road surfaces in winter and insufficient strength and stability to support vehicular traffic are limitations that in places can be overcome by strengthening or replacing the base material. The permeability in the subsoil and the seasonal high water table are limitations for septic tank absorption fields, sanitary landfills and building sites. These limitations are difficult to overcome.

The land capability classification is IIw.

38B—Meadowville loam, 0 to 5 percent. This soil is very deep, level and gently sloping, and well drained and moderately well drained. It is on concave to slightly convex areas in depressions, on toe slopes, in saddle positions, and at heads of and along drainageways. The areas range from 2 to 20 acres.

Typically, the surface layer is dark brown loam 2 inches thick. The subsurface layer is brown loam 7 inches thick. The subsoil is 30 inches thick. The upper part of the subsoil is strong brown loam, the middle part is strong brown clay loam, and the lower part is strong brown gravelly loam. The substratum is multicolored sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Baile, Buckhall, Elioak, Gaila, and Glenville soils. A few small areas have a surface layer of gravelly loam, and a few have sandy to clayey overwash material on the surface. Included soils make up about 20 percent of this map unit.

Major soil properties—

Permeability: Surface layer—moderately rapid; subsoil—moderate to moderately rapid; substratum—moderate to moderately rapid
Available water capacity: High
Surface runoff: Slow to medium
Erosion hazard: Slight to moderate
Organic matter content: Moderate
Natural fertility: Low
Soil reaction: Very strongly acid through moderately acid
Depth of the root zone: 40 to 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to the seasonal high water table: 36 to 60 inches
Flooding: None

Most of the acreage of this soil is woodland. A few areas are used for cultivated crops, hay, and pasture. This soil is classified as prime farmland.

This soil is well suited to cultivated crops. The seasonal high water table interferes with seedbed preparation, cultivation, and harvesting operations in some areas. The main management needs are lime and fertilizer and surface or subsurface drainage. Conservation tillage, crop residue in and on the soil, and cover crops and grasses and legumes in the cropping system help increase organic matter content and maintain the tilth of the soil. Corn, soybeans, and small grains are suitable crops.

This soil is well suited to grasses and legumes. It is poorly suited to alfalfa. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Use of proper stocking rates, rotation grazing, deferred grazing, and use of lime and fertilizer are the main pasture management practices. Orchardgrass, Kentucky-31 fescue, red clover, and ladino clover are suitable species.

The potential productivity for northern red oak on this soil is moderately high. The estimated average annual production of wood per acre is 300 board-feet. Tree seeds, cuttings, and seedlings survive and grow well on this soil if competing vegetation is controlled or removed.

This soil is poorly suited to building site development and onsite waste disposal. Downslope runoff and the high water table in the spring and winter are the main limitations for building site development. Some of these limitations can be overcome by using subsurface drainage and by diverting the surface water. The soil does not have sufficient strength and stability to support vehicular traffic, but in places this limitation can be overcome by strengthening or replacing the base material. Sealing the bottom of sewage lagoons helps to

prevent seepage. Site preparation for most development uses is difficult because of wetness.

The land capability classification is IIe.

39B3—Minnieville clay loam, 2 to 7 percent slopes, severely eroded. This soil is very deep, gently sloping, and well drained. It is on convex ridges. The areas are irregularly rounded or oblong. They range from about 2 to 20 acres. Erosion has removed much of the original surface layer, and the subsoil is exposed in places.

Typically the surface layer is brown to dark brown clay loam 8 inches thick. The subsoil is red clay 40 inches thick. The substratum extends to a depth of 60 inches or more. It is red clay loam to a depth of 58 inches and is multicolored silty clay below that.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Buckhall, Elioak, Fairfax, and Glenelg soils. Also included are small areas with a surface layer of gravelly clay loam and a few areas that have less mica in the subsoil and substratum. Severely eroded spots with a surface layer of clay or silty clay are in some places. Included soils make up about 20 percent of this map unit.

Major soil properties—

Permeability: Moderate throughout
Available water capacity: Moderate
Surface runoff: Medium
Erosion hazard: Moderate
Organic matter content: Low
Natural fertility: Low to medium
Soil reaction: Strongly acid or moderately acid
Depth of the root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most of the acreage of this soil is woodland. The rest is used for cultivated crops, pasture, or hay.

This soil is suited to cultivated crops and small grains. Crops respond to applications of lime and fertilizer. Cover crops, conservation tillage, and crop residue in and on the soil help conserve moisture and control erosion. The soil has poor tilth, and erosion of the original surface layer has removed most of the organic matter content and many nutrients, causing poor germination and low yields.

This soil is well suited to most grasses and legumes. The main pasture management practices are use of lime and fertilizer, proper stocking rates, and controlled grazing. Kentucky-31 fescue, orchardgrass, red clover, ladino clover, and alfalfa are suitable species.

The potential productivity for northern red oak on this soil is moderately high. The estimated average annual production of wood per acre is 290 board-feet. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed.

This soil is suitable for building site development and onsite waste disposal. It does not have sufficient strength and stability to support vehicular traffic, but in places this limitation can be overcome by strengthening or replacing the base material. Shrinking and swelling often cause cracking in footings and basement walls, but in places this limitation can be overcome by reinforcing the footings and walls. Increasing the absorption area of septic tanks helps overcome the permeability. Sealing the bottom of sewage lagoons helps prevent seepage. The high clay content makes this soil difficult to spread when covering landfills. This limitation in places can be overcome by mixing or replacing the clayey material with a suitable soil.

The land capability classification is IIIe.

39C3—Minnieville clay loam, 7 to 15 percent slopes, severely eroded. This soil is very deep, strongly sloping, and well drained. It is on ridges and side slopes. The areas are irregularly rounded or oblong. They range from about 2 to 20 acres. Erosion has removed much of the original surface layer, and the subsoil is exposed in places.

Typically the surface layer is brown to dark brown clay loam 8 inches thick. The subsoil is red clay 40 inches thick. The substratum extends to a depth of 60 inches or more. It is red clay loam to a depth of 58 inches and is multicolored silty clay below that.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Buckhall, Elioak, Fairfax, and Glenelg soils. Also included are small areas with a surface layer of gravelly clay loam and a few areas that have less mica in the subsoil and substratum. Severely eroded spots with a surface layer of clay or silty clay are in some places. Included soils make up about 20 percent of this map unit.

Major soil properties—

Permeability: Moderate throughout
Available water capacity: Moderate
Surface runoff: Rapid
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low to medium
Soil reaction: Strongly acid or moderately acid

Depth of the root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most of the acreage of this soil is woodland. The rest is used for cultivated crops, pasture, or hay.

This soil is moderately well suited to cultivated crops and small grains. Slope and erosion are the main limitations. Crops respond to applications of lime and fertilizer. Cover crops, conservation tillage, and crop residue in and on the soil help conserve moisture and control erosion. The soil has poor tilth, and erosion of the original surface layer has removed most of the organic matter content and many nutrients, causing poor germination and low yields.

This soil is well suited to most grasses and legumes. The main pasture management practices are use of lime and fertilizer, proper stocking rates, and controlled grazing. Kentucky-31 fescue, orchardgrass, red clover, ladino clover, and alfalfa are suitable species.

The potential productivity for northern red oak on this soil is moderately high. The estimated average annual production of wood per acre is 290 board-feet. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed.

This soil is suitable for building site development and onsite waste disposal. It does not have sufficient strength and stability to support vehicular traffic, but in places this limitation can be overcome by strengthening or replacing the base material. Shrinking and swelling often cause cracking in footings and basement walls, but in places this limitation can be overcome by reinforcing the footings and walls. Increasing the absorption area of septic tanks helps overcome the permeability. Sealing the bottom of sewage lagoons helps prevent seepage. The high clay content makes this soil difficult to spread when covering landfills. This limitation in places can be overcome by mixing or replacing the clayey material with a suitable soil.

The land capability classification is IVe.

40B—Montalto silty clay loam, 2 to 7 percent slopes. This soil is very deep, gently sloping, and well drained. It is on side slopes and ridges. The areas are long and narrow to irregularly rounded and conform to the irregular contour of the landscape. Slopes are commonly convex, but a few small areas are concave. Shallow drainageways cross the areas at common intervals. The areas range from about 2 to 20 acres.

Typically, the surface layer is yellowish red silty clay loam about 7 inches thick. The subsoil is 38 inches thick. It is red clay in the upper part and red channery clay in the lower part. The substratum is multicolored channery loam 17 inches thick. Bedrock is at a depth of 62 inches.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Arcola, Jackland, Legore, and Waxpool soils. Also included are small areas with a cobbly and stony surface layer. Included areas make up about 20 percent of this unit.

Major soil properties—

Permeability: Surface layer—moderate to moderately rapid; subsoil—moderately slow; substratum—moderate
Available water capacity: Moderate to high
Surface runoff: Medium
Erosion hazard: Moderate
Organic matter content: Low to moderate
Natural fertility: Low to medium
Soil reaction: Very strongly acid through slightly acid
Depth of the root zone: Approximately 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to the seasonal high water table: More than 60 inches
Flooding: None

Most of the acreage of this soil is in cultivated crops. The rest is woodland and a few areas of pasture or hay. This soil is classified as prime farmland.

This soil is moderately well suited to cultivated crops and small grains. The main limitations are slope, erosion, and the level of fertility. Grasses and legumes and cover crops in the cropping system, conservation tillage, and crop residue in and on the soil help conserve moisture and control erosion. Corn, soybeans, and small grain are suitable species. The cobbly or stony included areas are best suited to permanent sod crops or woodland.

This soil is well suited to grasses and legumes. The main pasture management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, ladino clover, and alfalfa are suitable species.

The potential productivity for black oak on this soil is moderately high. The estimated average annual production of wood per acre is 290 board-feet. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed.

This soil is suitable for building site development and onsite waste disposal. It does not have sufficient strength and stability to support vehicular traffic and is subject to frost heave, but in places these limitations can be overcome by strengthening or replacing the base material. Increasing the absorption area of septic tanks helps overcome the permeability. Sealing the bottom of sewage lagoons helps prevent seepage. The high clay content makes the soil difficult to spread on landfills. In places this limitation can be overcome by mixing or replacing the clayey material with a suitable soil.

The land capability classification is IIe.

40C—Montalto silty clay loam, 7 to 15 percent slopes. This soil is very deep, strongly sloping, and well drained. It is on side slopes and ridges. The areas are long and narrow to irregularly rounded and conform to the irregular contour of the landscape. Slopes are commonly convex, but a few small areas are concave. Shallow drainageways cross the areas at common intervals. The areas range from about 2 to 20 acres.

Typically, the surface layer is yellowish red silty clay loam about 7 inches thick. The subsoil is 38 inches thick. It is red clay in the upper part and red channery clay in the lower part. The substratum is multicolored channery loam 17 inches thick. Bedrock is at a depth of 62 inches.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Arcola, Jackland, Legore, and Waxpool soils. Also included are small areas with a cobbly and stony surface layer. Included areas make up about 20 percent of this unit.

Major soil properties—

Permeability: Surface layer—moderate to moderately rapid; subsoil—moderately slow; substratum—moderate
Available water capacity: Moderate to high
Surface runoff: Medium
Erosion hazard: Severe
Organic matter content: Low to moderate
Natural fertility: Low to medium
Soil reaction: Very strongly acid through slightly acid
Depth of the root zone: Approximately 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to the seasonal high water table: More than 60 inches
Flooding: None

Most of the acreage of this soil is woodland. A few areas are in cultivated crops or pasture or hay.

This soil is suited to cultivated crops and small grains. The main limitations are slope, erosion, and the level of fertility. Grasses and legumes and cover crops in the cropping system, conservation tillage, and crop residue in and on the soil help conserve moisture and control erosion. Corn, soybeans, and small grains are suitable species. The cobbly or stony included areas are best suited to permanent sod crops or woodland.

This soil is well suited to grasses and legumes. The main pasture management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, ladino clover, and alfalfa are suitable species.

The potential productivity for black oak on this soil is moderately high. The estimated average annual production of wood per acre is 290 board-feet. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed.

This soil is suitable for building site development and onsite waste disposal. It does not have sufficient strength and stability to support vehicular traffic and is subject to frost heave, but in places these limitations can be overcome by strengthening or replacing the base material. Increasing the absorption area of septic tanks helps overcome the permeability. Sealing the bottom of sewage lagoons helps prevent seepage. The high clay content makes this soil difficult to spread on landfills. This limitation in places can be overcome by mixing or replacing the clayey material with a suitable soil.

The land capability classification is IIIe.

41B—Neabsco loam, 0 to 7 percent slopes. This soil is very deep, nearly level to gently sloping, and moderately well drained. It is on slightly convex to slightly concave ridgecrests. Slopes are convex but range to concave. The areas range from about 2 to 100 acres.

Typically, the surface layer is dark brown loam 2 inches thick. The subsurface layer is light yellowish brown loam 6 inches thick. The upper part of the subsoil is yellowish brown clay loam 9 inches thick. The middle part is a firm, dense layer, called a fragipan, that is yellowish brown loam 19 inches thick. The lower part of the subsoil is brownish yellow clay loam 16 inches thick. The substratum is mottled very gravelly sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas, mainly less than 2 acres each, of Buckhall, Elioak, Fairfax, and Glenelg soils. Also included are small

areas with a surface layer of gravelly loam, a few moderately eroded areas with a surface layer of clay loam and a few somewhat poorly drained areas. Included soils make up about 20 percent of the map unit.

Major soil properties—

Permeability: Surface layer and upper part of the subsoil—moderate; fragipan—slow or very slow; substratum—moderate or moderately rapid
Available water capacity: Very low to low
Surface runoff: Slow to medium
Erosion hazard: Slight to moderate
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: 12 to 30 inches, restricted by wetness and the fragipan
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to the seasonal high water table: 12 to 30 inches, perched
Flooding: None

Most of the acreage of this soil is woodland. The rest is in pasture and a few cultivated areas. If properly drained, the soil is classified as prime farmland.

This soil is poorly suited to cultivated crops. The seasonal high water table, the shallow rooting depth, and the low fertility level are the main limitations. The main management practice is providing drainage by using subsurface drains and open ditches. Wetness often interferes with cultivation and harvest operations in spring, winter, and fall. Corn and soybeans are the common crops.

This soil is well suited only to grasses and legumes that tolerate wet conditions. It is poorly suited to alfalfa. The main pasture management practices are weed control, use of lime and fertilizer, and controlled grazing. Kentucky-31 fescue, ladino clover, and other similar species are best suited.

The potential productivity for northern red oak on this soil is moderate. The estimated average annual production of wood per acre is 250 board-feet. The mortality rate for tree seeds, cuttings, and seedlings is high because of seasonal wetness and droughtiness in summer. The fragipan restricts root penetration, thus makes trees on this soil susceptible to windthrow. The main limitation for harvesting is wetness. The soil is soft when wet and does not support heavy equipment. In some areas wetness and windthrow can be overcome by planting wet-tolerant species and harvesting during dry seasons.

This soil is generally not suited to building site development or onsite waste disposal. The heaving of road surfaces, caused by frost action in the winter, and insufficient strength and stability to support vehicular traffic are limitations that can be overcome by strengthening the base material. The permeability and the seasonal high water table are limitations for septic tank absorption fields, sanitary landfills, and building sites. Site preparation is generally difficult because of these limitations.

The land capability classification is IIe.

41C—Neabsco loam, 7 to 15 percent slopes. This soil is very deep, strongly sloping, and moderately well drained. It is on slightly convex to slightly concave ridgecrests. Slopes are convex but range to concave. The areas range from about 2 to 100 acres.

Typically, the surface layer is dark brown loam 2 inches thick. The subsurface layer is light yellowish brown loam 6 inches thick. The upper part of the subsoil is yellowish brown clay loam 9 inches thick. The middle part is a firm, dense layer, called a fragipan, that is yellowish brown loam 19 inches thick. The lower part of the subsoil is brownish yellow clay loam 16 inches thick. The substratum is mottled very gravelly sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas, mainly less than 2 acres each, of Buckhall, Elioak, Fairfax, and Glenelg soils. Also included are small areas with a surface layer of gravelly loam, a few moderately eroded areas that have a surface layer of clay loam, and a few somewhat poorly drained areas. Included soils make up approximately 20 percent of this map unit.

Major soil properties—

Permeability: Surface layer and upper part of the subsoil—moderate; fragipan—slow or very slow; substratum—moderate or moderately rapid
Available water capacity: Very low to low
Surface runoff: Medium
Erosion hazard: Severe
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: 12 to 30 inches, restricted by wetness and the fragipan
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low

Depth to the seasonal high water table: 12 to 30 inches, perched
Flooding: None

Most of the acreage of this soil is woodland. The rest is in pasture and a few cultivated areas.

This soil is poorly suited to cultivated crops. The seasonal high water table, the shallow rooting depth, and the low fertility level are the main limitations. The main management practice is providing drainage by using subsurface drains and open ditches. Wetness often interferes with cultivation and harvest operations in spring, winter, and fall. Cover crops and grasses and legumes in the cropping system, conservation tillage, and crop residue in and on the soil help to control erosion in cultivated areas. Corn and soybeans are the common crops.

This soil is well suited only to grasses and legumes that tolerate wet conditions. It is poorly suited to alfalfa. The main pasture management practices are weed control, use of lime and fertilizer, and controlled grazing. Kentucky-31 fescue, ladino clover, and other similar species are best suited.

The potential productivity for northern red oak on this soil is moderate. The estimated average annual production of wood per acre is 250 board-feet. The mortality rate for tree seeds, cuttings, and seedlings is high because of seasonal wetness and droughtiness in summer. The fragipan restricts root penetration, making trees on this soil susceptible to windthrow. The main limitation for harvesting is wetness. The soil is soft when wet and does not support heavy equipment. In some areas wetness and windthrow can be overcome by planting wet-tolerant species and harvesting during dry seasons.

This soil is generally not suited to building site development or onsite waste disposal. The heaving of road surfaces, caused by frost action in the winter, and insufficient strength and stability to support vehicular traffic are limitations that can be overcome by strengthening the base material. The permeability and the seasonal high water table are limitations for septic tank absorption fields, sanitary landfills, and building sites. Site preparation is generally difficult because of those limitations.

The land capability classification is IIIe.

42B—Neabsco-Quantico complex, 2 to 7 percent slopes. These soils are very deep and gently sloping. They are on medium-wide to broad ridges. The areas of these soils are irregularly rounded to oblong and conform to the irregular contour of the landscape. Their slopes are generally convex, but many areas contain swales and depressions. The areas of these soils range from 2 to 100 acres. The areas of Neabsco and Quantico soils are so closely associated and so intermingled or are so small that they could not be mapped separately. This unit is about 45 percent moderately well drained Neabsco soils, 35 percent well drained Quantico soils, and 20 percent other soils.

Typically, the surface layer of the Neabsco soils is dark brown loam 2 inches thick. The subsurface layer is light yellowish brown loam 6 inches thick. The upper part of the subsoil is yellowish brown clay loam 9 inches thick. The middle part is a firm, dense layer, called a fragipan, that is yellowish brown loam 19 inches thick. The lower part of the subsoil is brownish yellow clay loam 16 inches thick. The substratum is mottled very gravelly sandy loam to a depth of 60 inches or more.

Typically, the surface layer of the Quantico soils is brown to dark brown loam 1 inch thick. The subsurface layer is light yellowish brown loam 12 inches thick. The subsoil is 34 inches thick. It is strong brown clay loam in the upper part and strong brown clay in the lower part. The substratum is strong brown sandy clay to a depth of 60 inches or more.

Included with these soils in mapping are small areas, generally less than 2 acres each, of Buckhall, Fairfax, and Lunt soils. Also included are a few eroded areas that have a surface layer of sandy clay loam or clay, a few areas that have a surface layer of gravelly loam, and a few small areas that have a red subsoil or a coarser textured subsoil.

Major properties of the Neabsco soils—

Permeability: Surface layer and upper part of the subsoil—moderate; fragipan—slow or very slow; substratum—moderate or moderately rapid
Available water capacity: Very low to low
Surface runoff: Medium
Erosion hazard: Moderate
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: 12 to 30 inches, restricted by wetness and the fragipan
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to the seasonal high water table: 12 to 30 inches, perched
Flooding: None

Major properties of the Quantico soils—

Permeability: Surface layer—moderately rapid; subsoil—moderate; substratum—moderate or moderately rapid
Available water capacity: Moderate
Surface runoff: Medium
Erosion hazard: Moderate
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most of the acreage of this map unit is woodland. A small acreage is in pasture, and a few areas are cultivated.

This unit is poorly suited to cultivated crops. The seasonal high water table and shallow rooting depth in the Neabsco soils are the main limitations. Providing subsurface drainage in the Neabsco soils is a common practice. Seasonal wetness in the Neabsco soils often interferes with cultivation and harvest operations. The Quantico soils are moderately well suited to most cultivated crops and small grains grown in the county.

The Neabsco soils are well suited only to grasses and legumes that tolerate wet conditions. They are poorly suited to alfalfa. The Quantico soils are well suited to grasses and legumes and moderately well suited to alfalfa. The main pasture management practices are weed control, use of lime and fertilizer, and controlled grazing. Kentucky-31 fescue, ladino clover, and other similar species are suited.

The potential productivity for northern red oak on the Neabsco soils is moderate, and the estimated average annual production of wood per acre is 250 board-feet. The potential productivity of the Quantico soils is moderately high, and the estimated average annual production of wood per acre is 290 board-feet. The mortality rate for tree seeds, cuttings, and seedlings is high because of the seasonal high water table and droughtiness in the Neabsco soils. The seasonal high water table and fragipan in the Neabsco soils restrict root penetration and thus make trees on these soils susceptible to windthrow. Wetness is a hazard for harvesting on the Neabsco soils. The Neabsco soils are soft when wet and do not support heavy equipment. In some areas wetness and windthrow can be overcome by planting wet-tolerant species and harvesting during dry seasons.

The Neabsco soils are generally not suited to building site development or onsite waste disposal. The Quantico soils are generally suited to both uses. The heaving of road surfaces, insufficient strength and stability to support vehicular traffic, and the seasonal high water table in the Neabsco soils are limitations that in places can be overcome by strengthening the base material and using drainage. The permeability and the seasonal high water table in the Neabsco soils and the permeability in the Quantico soils are limitations for septic tank absorption fields, sanitary landfills, and building sites. Increasing the absorption area for septic tanks helps overcome the permeability in the Quantico soils. The high clay content makes this soil difficult to spread on landfills. This can be overcome be mixing the clayey material with a less clayey soil or by replacing the clayey material.

The land capability classification is IIw.

43D—Nestoria gravelly silt loam, 7 to 25 percent slopes. This soil is shallow, strongly sloping to moderately steep, and well drained. It is on side slopes. The areas are mostly long and narrow and conform to the irregular contour of the landscape. Shallow drainageways cross some of the areas. Slopes are convex but range to slightly concave. The areas range from 2 to 20 acres.

Typically, the surface layer is reddish brown gravelly silt loam 8 inches thick. The subsoil is reddish brown very gravelly silt loam 6 inches thick. The substratum is reddish brown very gravelly silt loam 4 inches thick. Bedrock is at a depth of 18 inches.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Albano, Arcola, Dulles, Manassas, and Panorama soils. Also included are very steep areas. Inclusions make up 20 percent of this unit.

Major soil properties—

Permeability: Moderate throughout
Available water capacity: Very low
Surface runoff: Rapid
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid to moderately acid
Depth of the root zone: 10 to 20 inches, restricted by rock
Depth to bedrock: 10 to 20 inches, soft

Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are woodland; a few areas are used for pasture.

This unit is poorly suited to cultivated crops and alfalfa. The main limitations are droughtiness, slope, and erosion.

This unit is poorly suited to grasses and legumes. Droughtiness and slope are the main limitations. The main management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, and ladino clover are common species.

The potential productivity for northern red oak on this soil is moderate. The estimated average annual production of wood per acre on slopes of less than 15 percent is 250 board-feet on the north-facing slopes and 200 board-feet on the south-facing slopes. For areas with slopes of more than 15 percent, it is low on the south-facing slopes and moderate on the north-facing slopes. Tree seeds, cuttings, and seedlings have high mortality rate caused by droughtiness. Slope is the main limitation for harvesting. Gully erosion is a hazard on skid trails.

This soil is very poorly suited to building site development and onsite waste disposal. The depth to bedrock, seepage, slope, and droughtiness are the main limitations.

The land capability classification is VIe.

43E—Nestoria gravelly silt loam, 25 to 50 percent slopes. This soil is shallow, steep or very steep, and well drained. It is on side slopes. The areas are mostly long and narrow and conform to the irregular contour of the landscapes. Shallow drainageways cross some of the areas. Slopes are convex but range to slightly concave. The areas range from 2 to 20 acres.

Typically, the surface layer is reddish brown gravelly silt loam 8 inches thick. The subsoil is reddish brown very gravelly silt loam 6 inches thick. The substratum is reddish brown very gravelly silt loam 4 inches thick. Bedrock is at a depth of 18 inches.

Included with this soil in mapping are small areas, generally less that 2 acres each, of Arcola and Panorama soils. Inclusions make up 20 percent of this unit.

Major soil properties—

Permeability: Moderate throughout
Available water capacity: Very low
Surface runoff: Very rapid
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid to moderately acid
Depth of the root zone: 10 to 20 inches, restricted by rock
Depth to bedrock: 10 to 20 inches, soft
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are woodland; a few areas are used for pasture.

This unit is poorly suited to cultivated crops and alfalfa. The main limitations are droughtiness, slope, and erosion.

This unit is very poorly suited to grasses and legumes. Droughtiness and slope are the main limitations. The main management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, and ladino clover are common species.

The potential productivity for northern red oak on this soil is moderate. The estimated average annual production of wood per acre is 250 board-feet on the north-facing slopes and 200 board-feet on the south-facing slopes. Tree seeds, cuttings, and seedlings have high mortality rate caused by droughtiness. Slope is the main limitation for harvesting. Gully erosion is a hazard on skid trails.

This soil is very poorly suited to building site development and onsite waste disposal. The depth to bedrock, seepage, slope, and droughtiness are the main limitations.

The land capability classification is VIIe.

44D—Occoquan sandy loam, 7 to 25 percent slopes. This soil is deep, strongly sloping to moderately steep, and somewhat excessively drained and well drained. It is on side slopes. The areas are generally convex and long and narrow and conform to the irregular contour of the landscape. Shallow to deep drainageways cross the areas at common intervals.

Slopes are generally convex but range to slightly concave. The areas range from 2 to 20 acres.

Typically, the surface is dark grayish brown sandy loam 2 inches thick. The subsurface layer is pale brown sandy loam 7 inches thick. The subsoil is strong brown loam 8 inches thick. The substratum extends to a depth of 60 inches or more. It is multicolored sandy loam to a depth of 53 inches and below that is partially weathered granite gneiss with tongues of sandy loam.

Included with this soil in mapping are small areas, generally less that 2 acres each, of Buckhall, Fairfax, Hoadly, and Meadowville soils. Rock outcrops are in a few areas. A few small areas are shallower than 20 inches to bedrock, and a few areas are more than 25 percent rock fragments in the surface layer and subsoil. Inclusions make up about 20 percent of this map unit.

Major soil properties—

Permeability: Surface layer—moderately rapid; subsoil—moderate to moderately rapid; substratum—moderately rapid
Available water capacity: Low to moderate
Surface runoff: Moderate to rapid
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth of the root zone: 40 to 60 inches, restricted by rock
Depth to bedrock: 40 to 60 inches, soft
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are woodland; a few areas are used for pasture.

This soil is poorly suited to cultivated crops. The main limitations are droughtiness, slope, erosion, and low fertility.

This unit is suited to grasses and legumes. It is poorly suited to alfalfa. Drought, low fertility, and slope are the main limitations. The main pasture management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, and ladino clover are common species.

The potential productivity for northern red oak on this soil is moderate. The estimated average annual production of wood per acre is 250 board-feet on the north-facing slopes and 200 board-feet on the south-facing slopes. Tree seeds, cuttings, and seedlings have a high mortality rate caused by droughtiness, especially on south-facing slopes of more than 15 percent. Slope is the major limitation for harvesting trees. Erosion is a hazard on skid trails that are straight up and down the slope instead of on the contour.

This soil is generally poorly suited to building site development or onsite waste disposal. The depth to bedrock, seepage, slope, and droughtiness are the major limitations.

The land capability classification is VIe.

44E—Occoquan sandy loam, 25 to 50 percent slopes. This soil is deep, steep or very steep, and somewhat excessively drained and well drained. It is on side slopes. The areas are generally convex and long and narrow and conform to the irregular contour of the landscape. Shallow to deep drainageways cross the areas at common intervals. Slopes are convex but range to slightly concave. The areas range from 2 to 20 acres.

Typically, the surface is dark grayish brown sandy loam 2 inches thick. The subsurface layer is pale brown sandy loam 7 inches thick. The subsoil is strong brown loam 8 inches thick. The substratum extends to a depth of 60 inches or more. It is multicolored sandy loam to a depth of 53 inches and below that is partially weathered granite gneiss with tongues of sandy loam.

Included with this soil in mapping are small areas, generally less that 2 acres each, of Buckhall, Fairfax, Hoadly, and Meadowville soils. Rock outcrops are in a few areas. A few small areas are shallower than 20 inches to bedrock, and a few areas are more than 25 percent rock fragments in the surface layer and subsoil. Inclusions make up about 20 percent of this map unit.

Major soil properties—

Permeability: Surface layer—moderately rapid; subsoil—moderate to moderately rapid; substratum—moderately rapid
Available water capacity: Low to moderate
Surface runoff: Rapid
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low
Soil reaction: Extremely acid to strongly acid
Depth of the root zone: 40 to 60 inches, restricted by rock
Depth to bedrock: 40 to 60 inches, soft
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are woodland; a few areas are used for pasture.

This soil is poorly suited to cultivated crops. The main limitations are droughtiness, slope, erosion, and low fertility.

This unit is poorly suited to grasses and legumes. The main pasture management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, and ladino clover are common species.

The potential productivity for northern red oak on this soil is moderate. The estimated average annual production of wood per acre is 250 board-feet on the north-facing slopes and 200 board-feet on the south-facing slopes. Tree seeds, cuttings, and seedlings have a high mortality rate caused by droughtiness, especially on south-facing slopes of more than 15 percent. Slope is the major limitation for harvesting trees.

This soil is generally poorly suited to building site development or onsite waste disposal. The depth to bedrock, seepage, slope, and droughtiness are the major limitations.

The land capability classification is VIIe.

45C—Orenda loam, 7 to 15 percent slopes. This soil is very deep, strongly sloping, and well drained. It is on convex ridges and side slopes. The areas are irregularly rounded or oblong. They range from about 2 to 25 acres.

Typically, the surface layer is dark brown loam 8 inches thick. The subsoil is 32 inches thick. It is strong brown clay in the upper part and yellowish red clay loam in the lower part. The substratum is 26 inches thick. It is yellowish red sandy clay loam in the upper part and strong brown sandy loam in the lower part. Bedrock is at a depth of 66 inches.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Buckhall, Fairfax, and Minnieville soils. Also included are small areas with a surface layer of gravelly loam and severely eroded spots with a surface layer of clay or silty clay. Included soils make up about 25 percent of this map unit.

Major soil properties—

Permeability: Surface layer—moderate; subsoil—moderately slow; substratum—moderate
Available water capacity: Moderate
Surface runoff: Rapid
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Medium
Soil reaction: Strongly acid or moderately acid
Depth of the root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most of the acreage of this soil is woodland. The rest is in cultivated crops, hay, and pasture.

This soil is moderately well suited to cultivated crops and small grains. Slope and erosion are the main limitations. Crops respond to applications of lime and fertilizer. Cover crops, conservation tillage, and crop residue in and on the soil help conserve moisture and control erosion. The main crops are corn, soybeans, wheat, and oats.

This soil is well suited to most grasses and legumes. The main pasture management practices are use of lime and fertilizer, use of proper stocking rates, and controlled grazing. Kentucky-31 fescue, orchardgrass, red clover, ladino clover, and alfalfa are suitable species.

The potential productivity for northern red oak on this soil is moderately high. The estimated average annual production of wood per acre is 400 board-feet. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed.

This soil is suitable for building site development and onsite waste disposal. It does not have sufficient strength and stability to support vehicular traffic, but this limitation can be overcome in places by strengthening or replacing the base material. Shrinking and swelling of the soil often cause cracks in footings and basement walls. Reinforcing the footings and walls helps to prevent cracking. The permeability is a limitation for septic tank absorption fields. Slope is a difficult limitation to overcome for sewage lagoons. The high clay content makes this soil difficult to spread on landfills. This can be overcome be mixing the clayey material with a less clayey soil or by replacing the clayey material.

The land capability classification is IIIe.

46B—Panorama silt loam, 2 to 7 percent slopes. This soil is deep, gently sloping, and well drained. It is on ridgecrests and side slopes. Slopes are commonly convex but range to concave in a few places. The areas are long and narrow to irregularly rounded and conform to the irregular contour of the landscape. Shallow drainageways cross the areas at common intervals. The

areas range from approximately 2 to 40 acres.

Typically, the surface layer is reddish brown silt loam 10 inches thick. The subsoil is about 45 inches thick. The upper part of the subsoil is reddish brown and weak red silty clay loam, the middle part is weak red clay loam, and the lower part is weak red and reddish brown very channery silty clay loam. Bedrock is at a depth of 55 inches.

Included with this soil in mapping are small areas of Albano, Arcola, Nestoria, and Reaville soils. Inclusions make up approximately 25 percent of this map unit.

Major soil properties—

Permeability: Moderate throughout
Available water capacity: Moderate
Surface runoff: Medium
Erosion hazard: Moderate
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: 40 to 60 inches, restricted by rock
Depth to bedrock: 40 to 60 inches, soft
Shrink-swell potential: Moderate
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most of the acreage of this soil is in cultivated crops, hay, and pasture. A few areas are woodland.

This soil is well suited to cultivated crops, small grains, and alfalfa. The main limitations are erosion and low fertility. Crops respond well to lime and fertilizer. Cover crops, conservation tillage, and crop residue in and on the soil help conserve moisture and control erosion. The main crops are corn, soybeans, wheat, and oats.

This soil is well suited to grasses and legumes. The main pasture management practices are use of lime and fertilizer, weed control, proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, ladino clover, and alfalfa are suited species.

The potential productivity for northern red oak on this soil is moderately high. The estimated average annual production of wood per acre is 280 board-feet. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed.

This soil is suitable for building site development and most onsite waste disposal systems. The depth to bedrock is a limitation for septic tank absorption fields and trench-type sanitary landfills. Fill can be used in some areas to overcome this limitation. The heaving of road surfaces, caused by frost action in the winter, is a limitation that in places can be overcome by replacing the base material. Sealing the bottom of sewage lagoons helps to prevent seepage.

The land capability classification is IIe.

46C—Panorama silt loam, 7 to 15 percent slopes. This soil is deep, strongly sloping, and well drained. It is on side slopes. Slopes are commonly convex but range to concave in a few places. The areas are long and narrow to irregularly rounded and conform to the irregular contour of the landscape. Shallow drainageways cross the areas at common intervals. The areas range from approximately 2 to 40 acres.

Typically, the surface layer is reddish brown silt loam 10 inches thick. The subsoil is about 45 inches thick. The upper part of the subsoil is reddish brown and weak red silty clay loam, the middle part is weak red clay loam, and the lower part is weak red and reddish brown very channery silty clay loam. Bedrock is at a depth of 55 inches.

Included with this soil in mapping are small areas of Albano, Arcola, Nestoria, and Reaville soils. Inclusions make up approximately 25 percent of this map unit.

Major soil properties—

Permeability: Moderate throughout
Available water capacity: Moderate
Surface runoff: Medium
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: 40 to 60 inches, restricted by rock
Depth to bedrock: 40 to 60 inches, soft
Shrink-swell potential: Moderate
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most of the acreage of this soil is in cultivated crops, hay, and pasture. A few areas are woodland.

This soil is moderately well suited to cultivated crops and small grains. It is well suited to alfalfa. The main limitations are slope, erosion, and low fertility. Crops respond well to lime and fertilizer. Cover crops, conservation tillage, and crop residue in and on the soil help conserve moisture and control erosion. The main crops are corn, soybeans, wheat, and oats.

This soil is well suited to grasses and legumes. The main pasture management practices are use of lime

and fertilizer, weed control, proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, ladino clover, and alfalfa are suited species.

The potential productivity for northern red oak on this soil is moderately high. The estimated average annual production of wood per acre is 280 board-feet. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed.

This soil is suitable for building site development and for most onsite waste disposal systems. The depth to bedrock is a limitation for septic tank absorption fields and trench-type sanitary landfills. Fill can be used in some areas to overcome this limitation. The heaving of road surfaces, caused by frost action in the winter, is a limitation that in places can be overcome by replacing the base material. Sealing the bottom of sewage lagoons helps to prevent seepage, and slope is a limitation for sewage lagoons.

The land capability classification is IIIe.

47B—Quantico sandy loam, 2 to 7 percent slopes. This soil is very deep, gently sloping, and well drained. It is on narrow to medium-wide ridgetops and side slopes. Slopes are generally convex, and the areas are irregularly rounded to long and narrow. The areas range from about 2 to 20 acres.

Typically, the surface layer is brown to dark brown sandy loam 1 inch thick. The subsurface layer is light yellowish brown sandy loam 12 inches thick. The subsoil is strong brown and 34 inches thick. It is clay loam in the upper part and clay in the lower part. The substratum is strong brown sandy clay to a depth of 60 inches or more.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Buckhall, Fairfax, Lunt, and Neabsco soils. Also included are a few eroded areas that have a surface layer of sandy clay loam or clay, a few that have a surface layer of gravelly sandy loam, and a few that have a red subsoil. Included soils make up about 25 percent of this unit.

Major soil properties—

Permeability: Surface layer—moderately rapid; subsoil—moderate; substratum—moderate to moderately rapid
Available water capacity: Moderate
Surface runoff: Medium
Erosion hazard: Moderate
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are woodland. A few areas are in cultivated crops, hay, and pasture. This soil is classified as prime farmland.

The soil is moderately well suited to cultivated crops. The main limitations are slope and low fertility. Cover crops and grasses and legumes in the cropping system, conservation tillage, and crop residue in and on the soil help conserve moisture and control erosion. Corn, soybeans, wheat, and oats are suited crops.

This soil is well suited to grasses and legumes. The main pasture management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, ladino clover, and alfalfa are suitable species.

The potential productivity for northern red oak on this soil is moderately high. The estimated average annual production of wood per acre is 290 board-feet. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed.

This soil is suitable for building site development and onsite waste disposal. It does not have sufficient strength and stability to support vehicular traffic, but this limitation can be overcome in places by strengthening or replacing the base material. The permeability is a limitation for septic tank absorption fields. The high clay content makes this soil difficult to spread on landfills. This can be overcome by mixing the clayey material with a less clayey soil or by replacing the clayey material. Sealing the bottom of sewage lagoons helps to prevent seepage.

The land capability classification is IIe.

47C—Quantico sandy loam, 7 to 15 percent slopes. This soil is very deep, strongly sloping, and well drained. It is on narrow to medium-wide ridgetops and side slopes. Slopes are generally convex, and the areas are irregularly rounded to long and narrow. The areas range from about 2 to 20 acres.

Typically, the surface layer is brown to dark brown sandy loam 1 inch thick. The subsurface layer is light yellowish brown sandy loam 12 inches thick. The subsoil is strong brown and 34 inches thick. It is clay loam in the upper part and clay in the lower part. The substratum is strong brown sandy clay to a depth of 60 inches or more.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Buckhall, Fairfax, Lunt, and Neabsco soils. Also included are a few eroded areas that have a surface layer of sandy clay loam or clay, a few that have a surface layer of gravelly sandy loam surfaces, and a few that have a red or coarser textured subsoil or a fragipan. Included soils make up about 25 percent of this unit.

Major soil properties—

Permeability: Surface layer—moderately rapid; subsoil—moderate; substratum—moderate to moderately rapid
Available water capacity: Moderate
Surface runoff: Medium
Erosion hazard: Severe
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are woodland. A few areas are in cultivated crops, hay and pasture.

The soil is poorly suited to cultivated crops. The main limitations are slope and low fertility. Cover crops and grasses and legumes in the cropping system, conservation tillage, and crop residue in and on the soil help conserve moisture and control erosion. Corn, soybeans, wheat, and oats are common crops.

This soil is suited to grasses and legumes. The main pasture management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, ladino clover, and alfalfa are suitable species.

The potential productivity for northern red oak on this soil is moderately high. The estimated average annual production of wood per acre is 290 board-feet. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed.

This soil is suitable for building site development and onsite waste disposal. It does not have sufficient strength and stability to support vehicular traffic, but this limitation can be overcome in places by strengthening or replacing the base material. The permeability is a limitation for septic tank absorption fields. The high clay content makes this soil difficult to spread on landfills. This can be overcome by mixing the clayey material with a less clayey soil or by replacing the clayey material. Sealing the bottom of sewage lagoons helps to prevent seepage, and slope is a limitation for sewage lagoons.

The land capability classification is IIIe.

47D—Quantico sandy loam, 15 to 25 percent slopes. This soil is very deep, moderately steep, and well drained. It is on narrow side slopes. Slopes are generally convex, and the areas are irregularly rounded to long and narrow. The areas range from about 2 to 20 acres.

Typically, the surface layer is brown to dark brown sandy loam 1 inch thick. The subsurface layer is light yellowish brown sandy loam 12 inches thick. The subsoil is strong brown and 34 inches thick. It is clay loam in the upper part and clay in the lower part. The substratum is strong brown sandy clay to a depth of 60 inches or more.

Included with this soil in mapping are areas, generally less than 2 acres each, of Buckhall, Fairfax, Lunt, and Neabsco soils. Also included are a few eroded areas that have a surface layer of sandy clay loam or clay, a few that have a surface layer of gravelly sandy loam surfaces, and a few that have a red or coarser textured subsoil or a fragipan. Included soils make up about 25 percent of this unit.

Major soil properties—

Permeability: Surface layer—moderately rapid; subsoil—moderate; substratum—moderate through moderately rapid
Available water capacity: Moderate
Surface runoff: Very rapid
Erosion hazard: Severe
Organic matter content: Low to moderate
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are woodland. A few areas are in cultivated crops, hay, and pasture.

The soil is poorly suited to cultivated crops. The main limitations are slope, erosion, and low fertility.

This soil is moderately well suited to grasses and legumes. The main pasture management practices are

use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, ladino clover, and alfalfa are suitable species.

The potential productivity for northern red oak on north-facing slopes is moderately high, and the estimated average annual production of wood per acre is 290 board-feet. On south-facing slopes it is moderate and the estimated average annual production of wood per acre is 250 board-feet. Tree seeds, cuttings, and seedlings survive and grow well if competing vegetation is controlled or removed on north-facing slopes. The mortality rate is high on south-facing slopes. Slope is the major limitation for planting and harvesting. Erosion is a hazard on skid trails that are straight up and down the slope instead of on the contour.

This soil is poorly suited to building site development and to onsite waste disposal. Slope and erosion are major limitations. The soil does not have sufficient strength and stability to support vehicular traffic, but this limitation can be overcome in places by strengthening the base material. Increasing the absorption area for septic tanks helps overcome the permeability. The high clay content makes this soil difficult to spread on landfills. This can be overcome be mixing the clayey material with a less clayey soil or by replacing the clayey material.

The land capability classification is IVe.

48A—Reaville silt loam, 0 to 4 percent slopes. This soil is moderately deep, nearly level and gently sloping, and moderately well drained and somewhat poorly drained. It is in broad areas. The areas are irregularly rounded to oblong and conform to the irregular contour of the landscape. Slopes are convex but range to concave, and shallow drainageways cross the areas in places. The areas range from about 2 to 50 acres.

Typically, the surface layer is dark brown to brown silt loam about 8 inches thick. The subsoil is 11 inches thick. It is reddish brown silt loam in the upper part and reddish brown channery silty clay loam in the lower part. The substratum is dark reddish brown very channery silt loam 13 inches thick. Bedrock is at a depth of 31 inches.

Included with this soil in mapping are small areas, less than 2 acres each, of Albano, Arcola, Dulles, Nestoria, and Panorama soils. Inclusions make up approximately 20 percent of this unit.

Major soil properties—

Permeability: Surface layer—moderate; subsoil—slow; substratum—slow
Available water capacity: Low
Surface runoff: Slow
Erosion hazard: Slight
Organic matter content: Low to moderate
Natural fertility: Low to medium
Soil reaction: Strongly acid through slightly acid
Depth of the root zone: 20 to 40 inches, restricted by wetness and rock
Depth to bedrock: 20 to 40 inches, soft
Shrink-swell potential: Low
Depth to the seasonal high water table: 6 to 36 inches, apparent
Flooding: None

Most of the acreage of this soil is in cultivated crops, hay, and pasture. The rest is woodland.

The soil is poorly suited to cultivated crops. The seasonal high water table, shallow rooting, depth to bedrock, and level of fertility are the main limitations. Drainage by subsurface drains or open ditches helps to overcome the water table. Seasonal wetness often interferes with cultivation and harvest operations. Corn, soybeans, wheat, and oats are the general crops.

This soil is well suited only for those grasses and legumes that tolerate wet conditions. It is poorly suited to alfalfa. The main pasture management practices are weed control, use of lime and fertilizer, and controlled grazing. Kentucky-31 fescue, ladino clover, and other similar species are best suited.

The potential productivity for northern red oak on this soil is moderately high. The estimated average annual production of wood per acre is 300 board-feet. The mortality rate for tree seeds, cuttings, and seedlings is high because of wetness. The seasonal high water table and depth to bedrock restrict root penetration and thus cause windthrow. The main limitation for harvesting is wetness. The soil is soft when wet and does not support heavy equipment. In some areas wetness and windthrow hazard can be overcome by planting wet-tolerant species and harvesting during dry seasons.

This soil is generally not suited to building site development or for onsite waste disposal. Replacing or strengthening the base material helps to prevent frost-heave damage to roads. The slow permeability, the depth to bedrock, and the seasonal high water table are limitations for septic tank absorption fields, sanitary landfills, and building sites.

The land capability classification is IIIw.

49A—Rowland silt loam, 0 to 2 percent slopes. This soil is very deep, level to nearly level, and

moderately well drained and somewhat poorly drained. It is on low flood plains adjacent to the major streams in the county. The areas range from 2 to 20 acres.

Typically, the surface layer is dark reddish brown silt loam 11 inches thick. The subsoil is 17 inches thick. It is dark reddish brown silt loam in the upper part and reddish brown silty clay loam in the lower part. The substratum is brown channery silty clay loam to a depth of 48 inches and weathered siltstone that extends from 48 inches to a depth of at least 60 inches.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Arcola, Bermudian, Nestoria, and Panorama soils. Also included are few small areas with a surface layer of gravelly silt loam and a few areas that have sandy to clayey overwash material on the surface. In some areas hard bedrock is at a depth of less than 60 inches. Included soils make up about 20 percent of this map unit.

Major soil properties—

Permeability: Surface layer—moderately slow to moderate; subsoil—moderately slow to moderate; substratum—moderately rapid
Available water capacity: Moderate
Surface runoff: Slow
Erosion hazard: Slight
Organic matter content: Moderate
Natural fertility: Low to medium
Soil reaction: Very strongly acid through moderately acid
Depth of the root zone: About 30 to 40 inches, restricted by wetness
Depth to bedrock: More than 60 inches
Shrink-swell potential: Low
Depth to the seasonal high water table: 12 to 36 inches, apparent
Flooding: Frequent

Most of the acreage of this soil is in cultivated crops, hay, and pasture. The rest is woodland. If protected and properly drained, this soil is classified as prime farmland.

If drained, this soil is well suited to cultivated crops. The seasonal high water table and flooding interfere with seedbed preparation, cultivation, and harvesting operations in some areas. Conservation tillage, cover crops and grasses and legumes in the cropping system, and crop residue in and on the soil increase organic matter and maintain the tilth of the soil. Corn, soybeans, and small grains are the general crops grown.

This soil is well suited to grasses and legumes. It is poorly suited to alfalfa. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Use of proper stocking rates, rotation grazing, deferred grazing, and use of lime and fertilizer are the main pasture management practices. Orchardgrass, Kentucky-31 fescue, red clover, and ladino clover are suitable species.

The potential productivity for northern red oak on this soil is moderately high. The estimated average annual production of wood per acre is 300 board-feet. Tree seeds, cuttings, and seedlings survive and grow well on this soil if competing vegetation is controlled or removed. Wetness and flooding are the major limitations for planting and harvesting. These limitations can be overcome by planting and harvesting during dry periods.

This soil is poorly suited to building site development and to onsite waste disposal. Flooding and the seasonal high water table are the main limitations for building site development. In some areas they can be overcome by subsurface drainage and diversion of surface water. Site preparation to overcome the limitations from flooding is generally difficult.

The land capability classification is IIw.

50D—Spriggs silt loam, 15 to 25 percent slopes. This soil is moderately deep, moderately steep, and well drained. It is on side slopes of the uplands. The areas are generally convex and oblong to long and narrow and conform to irregular curvature of the landscape. Deep drainageways cross some areas. The areas range from approximately 2 to 50 acres.

Typically, the surface is dark brown silt loam 2 inches thick. The subsurface layer is yellowish brown silt loam 6 inches thick. The subsoil is strong brown clay loam 10 inches thich. The substratum is 30 inches thick. The upper part is yellowish red gravelly loam, and the lower part is partially weathered hornblende gneiss. Bedrock is at a depth of 48 inches.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Buckhall, Elioak, and Minnieville soils. Inclusions make up approximately 20 percent of this map unit.

Major soil properties—

Permeability: Moderate throughout
Available water capacity: Low
Surface runoff: Rapid
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid through moderately acid

Depth of the root zone: 20 to 40 inches, restricted by rock
Depth to bedrock: 20 to 40 inches, soft
Shrink-swell potential: Moderate
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are woodland. A small portion is in pasture.

This soil is poorly suited to cultivated crops. Slope and erosion are the major limitations. Long rotations with sod crops, conservation tillage, and winter cover crops help prevent erosion. Crop residue in and on the soil helps to improve tilth and increase the available water capacity.

This soil is suited to most grasses and legumes. The main limitation is slope, and the main concern is establishing and maintaining good stands. The main pasture management practices are weed control, use of lime and fertilizer, use of proper stocking rates, and controlled grazing.

The potential productivity for northern red oak on this soil is moderate. The estimated average annual production of wood per acre is 250 board-feet on the north-facing slopes and 200 board-feet on the south-facing slopes. Tree seeds, cuttings, and seedlings have a high mortality rate on the south-facing slopes because of droughtiness. Slope is the main limitation for harvesting trees. Gully erosion is a hazard on skid trails.

This soil is poorly suited to building site development and to onsite waste disposal. The major limitations are slope, the depth to bedrock, and the permeability.

The land capability classification is VIIe.

50E—Spriggs silt loam, 25 to 50 percent slopes. This soil is moderately deep, steep and very steep, and well drained. It is on side slopes of the uplands. The areas are generally convex and oblong to long and narrow and conform to irregular curvature of the landscape. Deep drainageways cross some areas. The areas range from approximately 2 to 100 acres.

Typically, the surface is dark brown silt loam 2 inches thick. The subsurface layer is yellowish brown silt loam 6 inches thick. The subsoil is strong brown clay loam 10 inches thick. The substratum is 30 inches thick. The upper part is yellowish red gravelly loam, and the lower part is partially weathered hornblende gneiss. Bedrock is at a depth of 48 inches.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Buckhall, Elioak, and Minnieville soils. Inclusions make up approximately 20 percent of this map unit.

Major soil properties—

Permeability: Moderate throughout
Available water capacity: Low
Surface runoff: Very rapid
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid through moderately acid
Depth of the root zone: 20 to 40 inches, restricted by rock
Depth to bedrock: 20 to 40 inches, soft
Shrink-swell potential: Moderate
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are woodland. A small portion is in pasture.

This soil is generally unsuited to cultivated crops. Slope and erosion are the major limitations.

This soil is poorly suited to most grasses and legumes. The main limitation is slope, and the main concern is establishing and maintaining good stands. The main pasture management practices are weed control, use of lime and fertilizer, use of proper stocking rates, and controlled grazing.

The potential productivity for northern red oak on this soil is moderate. The estimated average annual production of wood per acre is 250 board-feet on the north-facing slopes and 200 board-feet on the south-facing slopes. Tree seeds, cuttings, and seedlings have a high mortality rate on the south-facing slopes because of droughtiness. Slope is the main limitation for harvesting trees. Gully erosion is a hazard on skid trails.

This soil is generally unsuited to building site development or for onsite waste disposal. The major limitations are slope, the depth to bedrock, and the permeability.

The land capability classification is VIIe.

51D—Stumptown very flaggy loam, 7 to 25 percent slopes. This soil is moderately deep, strongly sloping and moderately steep, and well drained. It is on side slopes. The areas are generally convex and oblong to long and narrow and conform to irregular curvature of the landscape. Deep drainageways cross some of the areas. The areas range from approximately 2 to 100 acres.

Typically, the surface is dark grayish brown very flaggy loam 2 inches thick. The subsurface layer is light yellowish brown very flaggy loam 10 inches thick. The subsoil is brownish yellow very flaggy clay loam 8 inches thick. The substratum is 13 inches thick. The upper part is variegated extremely flaggy sandy loam, and the lower part is weathered bedrock. Hard bedrock is at a depth of 33 inches.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Airmont, Glenelg, and Braddock soils. Also included are small areas with fewer stone fragments and small areas of rock outcrop. Inclusions make up approximately 20 percent of this map unit.

Major soil properties—

Permeability: Moderately rapid throughout
Available water capacity: Low
Surface runoff: Medium to rapid
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: 20 to 40 inches, restricted by rock
Depth to bedrock: 20 to 40 inches, hard
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are woodland. A small portion is in pasture.

This soil is generally unsuited to cultivated crops. Slope, droughtiness, rock fragments, and erosion are the main limitations.

This soil is poorly suited to most grasses and legumes. It is poorly suited to alfalfa. The main limitations are droughtiness, slope, and rock fragments. The main pasture management practices are weed control, use of lime and fertilizer, use of proper stocking rates, and controlled grazing.

The potential productivity for chestnut oak on this soil is moderate. Only dry-site tree species are suited to this soil. The estimated average annual production of wood per acre is 200 board-feet on the north-facing slopes and 180 board-feet on the south-facing slopes. Tree seeds, cuttings, and seedlings have a high mortality rate because of droughtiness, especially on the south-facing slopes. Slope is the main limitation for harvesting trees. Gully erosion is a hazard on skid trails.

This soil is poorly suited to building site development and to onsite waste disposal. Slope, depth to bedrock, rock fragments, and droughtiness are the main limitations.

The land capability classification is VIs.

51E—Stumptown very flaggy loam, 25 to 50 percent slopes. This soil is moderately deep, steep to very steep, and well drained. It is on side slopes. The areas are generally convex and oblong to long and narrow and conform to irregular curvature of the landscape. Deep drainageways cross some of the areas. The areas range from approximately 2 to 100 acres.

Typically, the surface is dark grayish brown very flaggy loam 2 inches thick. The subsurface layer is light yellowish brown very flaggy loam 10 inches thick. The subsoil is brownish yellow very flaggy clay loam 8 inches thick. The substratum is 13 inches thick. The upper part is variegated extremely flaggy sandy loam, and the lower part is weathered bedrock. Hard bedrock is at a depth of 33 inches.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Airmont, Weverton, and Braddock soils. Also included are small areas with fewer stone fragments and small areas of rock outcrop. Inclusions make up approximately 20 percent of this map unit.

Major soil properties—

Permeability: Moderately rapid throughout
Available water capacity: Low
Surface runoff: Rapid
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low
Soil reaction: Very strongly acid or strongly acid
Depth of the root zone: 20 to 40 inches, restricted by rock
Depth to bedrock: 20 to 40 inches, hard
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are woodland. A small portion is in pasture.

This soil is generally unsuited to cultivated crops. Slope, droughtiness, rock fragments, and erosion are the main limitations.

This soil is poorly suited to most grasses and legumes. It is very poorly suited to alfalfa. The main limitations are droughtiness, slope, and rock fragments.

The main pasture management practices are weed control, use of lime and fertilizer, use of proper stocking rates, and controlled grazing.

The potential productivity for chestnut oak on this soil is moderate. Only dry-site tree species are suited to this soil. The estimated average annual production of wood per acre is 250 board-feet on the north-facing slopes and 180 board-feet on the south-facing slopes. Tree seeds, cuttings, and seedlings have a high mortality rate because of droughtiness, especially on the south-facing slopes. Slope is the main limitation for harvesting trees. Gully erosion is a hazard on skid trails.

This soil is poorly suited to building site development and to onsite waste disposal. Slope, depth to bedrock, rock fragments, and droughtiness are the main limitations.

The land capability classification is VIIe.

52B—Sudley-Oatlands complex, 2 to 7 percent slopes. These soils are gently sloping and well drained. They are on ridgecrests and side slopes. Slopes are commonly convex, but some small areas are concave. Shallow drainageways cross some areas. The areas of these soils are generally oblong. They range from about 2 to 100 acres. The Sudley and Oatlands soils are so closely associated and intricately mixed that they could not be mapped separately. This unit is about 50 percent very deep Sudley soils, 30 percent moderately deep Oatlands soils, and 20 percent other soils.

Typically, the surface layer of the Sudley soils is reddish brown loam 8 inches thick. The subsoil is about 34 inches thick. The upper part of the subsoil is yellowish red clay, and the lower part is yellowish red loam. The substratum extends to a depth of 60 inches or more. It is variegated loam to a depth of 52 inches and brown to dark brown gravelly sandy loam below that.

Typically, the surface layer of the Oatlands soils is reddish brown loam 8 inches thick. The subsoil is reddish brown loam 11 inches thick. The substratum is reddish brown and is 17 inches thick. It is very gravelly loam in the upper part and reddish brown extremely gravelly loam in the lower part. Bedrock is at a depth of 36 inches.

Included with these soils in mapping are areas, generally less than 2 acres each, of Albano, Arcola, Dulles, Nestoria, and Panorama soils.

Major properties of the Sudley soils—

Permeability: Moderate throughout
Available water capacity: Moderate
Surface runoff: Medium
Erosion hazard: Moderate
Organic matter content: Low
Natural fertility: Low to medium
Soil reaction: Very strongly acid through moderately acid
Depth of the root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Major properties of the Oatlands soils—

Permeability: Moderate throughout
Available water capacity: Low
Surface runoff: Medium
Erosion hazard: Moderate
Organic matter content: Low
Natural fertility: Low to medium
Soil reaction: Very strongly acid through moderately acid
Depth of the root zone: 20 to 40 inches, restricted by rock
Depth to bedrock: 20 to 40 inches, hard
Shrink-swell potential: Moderate
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most of the acreage of these soils is in cultivated crops, hay, and pasture. The rest of the acreage is woodland.

The Sudley soils are well suited to cultivated crops and small grains, and the Oatlands soils are suited. Droughtiness in the Oatlands soils, erosion, and low fertility are the main limitations. Crops respond to applications of lime and fertilizer. Cover crops and long rotations with grasses and legumes, conservation tillage, and crop residue in and on the soil help conserve moisture and control erosion. Corn, soybeans, wheat, and oats are suitable crops.

The Sudley soils are well suited to grasses and legumes. The Oatlands soils are well suited to grasses and moderately well suited to legumes. The main pasture management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, ladino clover, and alfalfa are suitable species.

The potential productivity for northern red oak on these soils is moderately high. The estimated average annual production of wood per acre is 280 board-feet

on the Sudley soils and 250 board-feet on the Oatlands soils. Tree seeds, cuttings, and seedlings survive and grow well on the Sudley soils if competing vegetation is controlled or removed. They have a high rate of mortality on the Oatlands soils because of droughtiness.

The Sudley soils are suitable and the Oatlands soil are poorly suited to building site development and to most onsite waste disposal systems. The depth to bedrock is a limitation for septic tank absorption fields and trench-type sanitary landfills. This limitation can be overcome by adding fill material. Replacing the base material helps to prevent frost-heave damage to roads. The soil does not have sufficient strength and stability to support vehicular traffic, but this limitation can be overcome in places by replacing or strengthening the base material. Sealing the bottoms of sewage lagoons helps to prevent seepage. Shrinking and swelling in the Sudley soils causes cracks in basement walls. Reinforcing footings and the walls helps to prevent cracking.

The land capability classification is IIs.

52C—Sudley-Oatlands complex, 7 to 15 percent slope. These soils are strongly sloping and well drained. They are on ridgecrests and side slopes. Slopes are commonly convex, but some small areas are concave. Shallow drainageways cross some areas. The areas of these soils are generally oblong. They range from about 2 to 100 acres. The Sudley and Oatlands soils are so closely associated and intricately mixed that they could not be mapped separately. This unit is about 50 percent very deep Sudley soils, 30 percent moderately deep Oatlands soils, and 20 percent other soils.

Typically, the surface layer of the Sudley soils is reddish brown loam 8 inches thick. The subsoil is about 34 inches thick. The upper part of the subsoil is yellowish red clay, and the lower part is yellowish red loam. The substratum extends to a depth of 60 inches or more. It is variegated loam to a depth of 52 inches and brown to dark brown gravelly sandy loam below that.

Typically, the surface layer of the Oatlands soils is reddish brown loam 8 inches thick. The subsoil is reddish brown loam 11 inches thick. The substratum is reddish brown and is 17 inches thick. It is very gravelly loam in the upper part and reddish brown extremely gravelly loam in the lower part Bedrock is at a depth of 36 inches.

Included with these soils in mapping are areas, generally less than 2 acres each, of Albano, Arcola, Dulles, Nestoria, and Panorama soils.

Major properties of the Sudley soils—

Permeability: Moderate throughout
Available water capacity: Moderate
Surface runoff: Medium
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low to medium
Soil reaction: Very strongly acid through moderately acid
Depth of the root zone: More than 60 inches
Depth to bedrock: More than 60 inches
Shrink-swell potential: Moderate
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Major properties of the Oatlands soils—

Permeability: Moderate throughout
Available water capacity: Low
Surface runoff: Medium
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low to medium
Soil reaction: Very strongly acid through moderately acid
Depth of the root zone: 20 to 40 inches, restricted by rock
Depth to bedrock: 20 to 40 inches, hard
Shrink-swell potential: Moderate
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most of the acreage of these soils is in cultivated crops, hay, and pasture. The rest of the acreage is woodland.

These soils are suited to cultivated crops and small grains. Droughtiness in the Oatlands soils, erosion, and low fertility are the main limitations. Crops respond to applications of lime and fertilizer. Cover crops and long rotations with grasses and legumes, conservation tillage, and crop residue in and on the soil help conserve moisture and control erosion. Corn, soybeans, wheat, and oats are suitable crops.

The Sudley soils are well suited to grasses and legumes. The Oatlands soils are well suited to grasses and moderately well suited to legumes. The main pasture management practices are use of lime and fertilizer, weed control, use of proper stocking rates, and controlled grazing. Orchardgrass, Kentucky-31 fescue, red clover, ladino clover, and alfalfa are suitable species.

The potential productivity for northern red oak on these soils is moderately high. The estimated average

annual production of wood per acre is 280 board-feet on the Sudley soils and 250 board-feet on the Oatlands soils. Tree seeds, cuttings, and seedlings survive and grow well on the Sudley soils if competing vegetation is controlled or removed. They have a high rate of mortality on the Oatlands soils because of droughtiness.

The Sudley soils are suitable and the Oatlands soils are poorly suited to building site development and to most onsite waste disposal systems. The depth to bedrock is a limitation for septic tank absorption fields and trench-type sanitary landfills. This limitation can be overcome by adding fill material. Replacing the base material helps to prevent frost-heave damage to roads. The soil does not have sufficient strength and stability to support vehicular traffic, but this limitation can be overcome in places by replacing or strengthening the base material. Sealing the bottoms of sewage lagoons helps to prevent seepage. Shrinking and swelling in the Sudley soils causes cracks in basement walls. Reinforcing footings and the walls helps to prevent cracking.

The land capability classification is IIIe.

53B—Sycoline-Kelly complex, 2 to 7 percent slopes. This unit consists of gently sloping soils on upland flats and crests. Slopes are slightly convex to slightly concave. The areas are irregularly rounded to long and narrow and range from approximately 2 to 20 acres. The Sycoline and Kelly soils are so closely associated and intricately mixed that they could not be mapped separately. This unit is about 50 percent moderately deep and moderately well drained Sycoline soils, 30 percent deep and somewhat poorly drained Kelly soils, and 20 percent other soils.

Typically, the surface layer of the Sycoline soils is very dark grayish brown silt loam 2 inches thick. The subsurface layer is grayish brown silt loam 7 inches thick. The subsoil is 17 inches thick. It is yellowish brown silty clay loam that is mottled in the lower part. The substratum is dominantly brownish yellow silt loam 7 inches thick. Bedrock is at a depth of 33 inches.

Typically, the surface layer of the Kelly soils is very dark grayish brown silt loam 1 inch thick. The subsurface layer is brown silt loam 8 inches thick. The subsoil is about 32 inches thick. The upper part of the subsoil is light olive brown silty clay loam; the middle part is mottled, very dark grayish brown and dark gray clay; and the lower part is mottled, very dark gray clay and multicolored gravelly silty clay. The substratum is very dark grayish brown partially weathered hornfels 4 inches thick. Bedrock is at a depth of 45 inches.

Included in this unit are small areas, generally less than 2 acres each, of Catlett, Jackland, and Waxpool soils.

Major properties of the Sycoline soils—

Permeability: Surface layer—moderately slow; upper part of the subsoil—moderately slow; lower part of the subsoil—very slow; substratum—very slow
Available water capacity: Moderate
Surface runoff: Slow to medium
Erosion hazard: Moderate
Organic matter content: Low
Natural fertility: Low to medium
Soil reaction: Very strongly acid through moderately acid
Depth of the root zone: 20 to 40 inches, restricted by rock and wetness
Depth to bedrock: 20 to 40 inches, hard
Shrink-swell potential: Moderate
Depth to the seasonal high water table: 18 to 36 inches, perched
Flooding: None

Major properties of the Kelly soils—

Permeability: Surface layer—moderate; subsoil—slow to very slow; substratum—slow
Available water capacity: Moderate
Surface runoff: Slow to medium
Erosion hazard: Moderate
Organic matter content: Low
Natural fertility: Low to medium
Soil reaction: Surface layer—very strongly acid through moderately acid; subsoil—slightly acid or neutral; substratum—slightly acid or neutral
Depth of the root zone: 30 to 60 inches, restricted by rock and wetness
Depth to bedrock: 40 to 60 inches, hard
Shrink-swell potential: High
Depth to the seasonal high water table: 18 to 30 inches, apparent
Flooding: None

Most areas of these soils are woodland. A few areas are in pasture.

This unit is poorly suited to cultivated crops and small grains. The main limitation is the seasonal high water table. Artificial drainage is needed for row crops and makes the soils suitable for corn, soybeans, and small grains.

This unit is moderately well suited to grasses and legumes that tolerate wet conditions. It is very poorly suited to alfalfa. The main management practices are artificial drainage, use of lime and fertilizer, weed

control, and controlled grazing. Kentucky-31 fescue, ladino clover, and similar wet-tolerant species are best suited.

The potential productivity for northern red oak on these soils is moderate. The estimated average annual production of wood per acre is 250 board-feet. Tree seeds, cuttings, and seedlings have a high rate of mortality because of wetness. Planting trees that tolerate wetness helps to overcome this limitation. The soil is soft when wet and does not support heavy harvesting equipment. Harvesting during dry seasons helps reduce rutting by heavy equipment.

This unit is poorly suited to building site development and to onsite waste disposal. The seasonal high water table and low strength limit the soils for building site development. Placing footings on bedrock and providing drainage will help overcome these limitations. The seasonal high water table and the bedrock limit the soil for onsite waste disposal. If water disposal areas can be located, subsurface layer drainage in places can be used to help overcome the wetness at building sites. The wetness and slow to very slow permeability in the subsoil are limitations for septic tank absorption fields.

The land capability classification is IVw.

53C—Sycoline-Kelly complex, 7 to 15 percent slopes. This unit consists of strongly sloping soils on ridges and side slopes. Slopes are slightly convex to slightly concave. The areas are irregularly rounded to long and narrow and range from approximately 2 to 20 acres. The Sycoline and Kelly soils are so closely associated and intricately mixed that they could not be mapped separately. This unit is about 50 percent moderately deep and moderately well drained Sycoline soils, 30 percent deep and somewhat poorly drained Kelly soils, and 20 percent other soils.

Typically, the surface layer of the Sycoline soils is very dark grayish brown silt loam 2 inches thick. The subsurface layer is grayish brown silt loam 7 inches thick. The subsoil is 17 inches thick. It is yellowish brown silty clay loam that is mottled in the lower part. The substratum is dominantly brownish yellow silt loam 7 inches thick. Bedrock is at a depth of 33 inches.

Typically, the surface layer of the Kelly soils is very dark grayish brown silt loam 1 inch thick. The subsurface layer is brown silt loam 8 inches thick. The subsoil is about 32 inches thick. The upper part of the subsoil is light olive brown silty clay loam; the middle part is mottled, very dark grayish brown and dark gray clay; and the lower part is mottled, very dark gray clay and multicolored gravelly silty clay. The substratum is very dark grayish brown partially weathered hornfels 4 inches thick. Bedrock is at a depth of 45 inches.

Included in this unit are small areas, generally less than 2 acres each, of Catlett, Jackland, and Waxpool soils.

Major properties of the Sycoline soils—

Permeability: Surface layer—moderately slow; upper part of the subsoil—moderately slow; lower part of the subsoil—very slow; substratum—very slow
Available water capacity: Moderate
Surface runoff: Medium
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low to medium
Soil reaction: Very strongly acid through moderately acid
Depth of the root zone: 20 to 40 inches, restricted by rock and wetness
Depth to bedrock: 20 to 40 inches, hard
Shrink-swell potential: Moderate
Depth to the seasonal high water table: 18 to 36 inches, perched
Flooding: None

Major properties of the Kelly soils—

Permeability: Surface layer—moderate; subsoil—slow to very slow; substratum—slow
Available water capacity: Moderate
Surface runoff: Medium
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low to medium
Soil reaction: Surface layer—very strongly acid through moderately acid; subsoil—slightly acid or neutral; substratum—slightly acid or neutral
Depth of the root zone: 30 to 60 inches, restricted by rock and wetness
Depth to bedrock: 40 to 60 inches, hard
Shrink-swell potential: High
Depth to the seasonal high water table: 18 to 30 inches, apparent
Flooding: None

Most areas of these soils are woodland. A few areas are in pasture.

This unit is poorly suited to cultivated crops and small grains. The main limitation is the seasonal high water table. Artificial drainage is needed for row crops and makes the soils suitable for corn, soybeans, and small grains.

This unit is moderately well suited to grasses and legumes that tolerate wet conditions. It is very poorly

suited to alfalfa. The main management practices are artific al drainage. use of lime and fertilizer, weed control, and contro led grazing. Kentucky-31 fescue, ladino clover, and similar wet-tolerant species are best suited.

The potential productivity for northern red oak on these soils is moderate. The estimated average annual production of wood per acre is 250 board-feet. Tree seeds, cuttings, and seedlings have a high rate of mortality because of wetness. Planting trees that tolerate wetness helps to overcome this limitation. The soil is soft when wet and does not support heavy harvesting equipment. Harvesting during dry seasons helps reduce rutting by heavy equipment.

This unit is poorly suited to building site development and to onsite waste disposal. The seasonal high water table and low strength limit the soils for building site development. Placing footings on bedrock and providing drainage will help overcome those limitations. The seasonal high water table and the bedrock limit the soil for onsite waste disposal. If water disposal areas can be located subsurface layer drainage in places can be used to help overcome the wetness at building sites. The wetness and slow to very slow permeability in the subsoil are limitations for septic tank absorption fields.

The land capability classification is IVw.

54B—Urban land-Udorthents complex, 0 to 7 percent slopes. This soil complex consists of areas where 85 percent or more of the surface layer is covered by asphalt, concrete, or other impervious surfaces and areas of shallow to very deep, nearly level to gently sloping, well drained and moderately well drained soils. The areas of this unit are irregular in shape and range from 2 to 250 acres. The urban land and Udorthents are so intermingled that it was not practical to map them separately. This unit is about 50 percent urban land, 40 percent Udorthents, and 10 percent other soils.

The Udorthents are areas where the soils have been altered during excavation or covered by earthy fill material.

Included with this unit in mapping are small areas of soils that have not been disturbed and many fill areas that have inclusions of materials such as concrete, wood, glass, and asphalt.

The permeability runoff, and available water capacity of this unit are variable. The erosion hazard is slight.

An onsite investigation is needed to determine the suitability and limitations of the unit for any use.

The land capability classification is unassigned.

55D—Watt channery silt loam, 15 to 25 percent slopes. This soil is moderately deep, moderately steep, and somewhat excessively drained. It is on side slopes. Slopes are commonly convex. Shallow to moderately deep drainageways cross the areas at frequent intervals. The areas are long and narrow and range from about 2 to 20 acres.

Typically the surface layer is very dark grayish brown channery silt loam 1 inch thick. The subsurface layer is dark grayish brown channery silt loam 6 inches thick. The subsoil is very dark gray very channery silt loam 9 inches thick. The substratum is black and very dark gray extremely channery silt loam 13 inches thick. Bedrock is at a depth of 29 inches.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Buckhall, Lunt, Occoquan, and Quantico soils. Also included are small areas with a surface layer of gravelly silt loam, small areas that are very shallow to rock or have rock outcrop, and small areas that have little or no subsoil. A few areas have moderately deep to deep gullies. Included soils make up about 20 percent of this map unit.

Major soil properties—

Permeability: Moderate to moderately rapid throughout
Available water capacity: Very low
Surface runoff: Rapid
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low
Soil reaction: Extremely acid through strongly acid
Depth of the root zone: 20 to 40 inches, restricted by rock
Depth to bedrock: 20 to 40 inches, soft
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are woodland. A small portion is in pasture.

This soil is poorly suited to cultivated crops. Slope, droughtiness, and erosion are the main limitations. Conservation tillage and winter cover crops help control erosion. Crop residue in and on the soil or the addition of other organic material helps to improve fertility and increase the available water capacity.

This soil is poorly suited to most grasses and legumes. It is poorly suited to alfalfa. The main limitations are droughtiness and slope. The main

pasture management practices are weed control, use of lime and fertilizer, use of proper stocking rates, and controlled grazing. Kentucky-31 fescue and ladino clover are common species.

The potential productivity for northern red oak on this soil is moderate. The estimated average annual production of wood per acre is 200 board-feet on the north-facing slopes and 175 board-feet on the south-facing slopes. Tree seeds, cuttings, and seedlings have a high mortality rate because of droughtiness, especially on the south-facing slopes. Slope is the main limitation for harvesting. Placing skid trails on the contour helps to control erosion.

This soil is very poorly suited to building site development and to onsite waste disposal. The depth to bedrock, seepage, slope, and droughtiness are the major limitations.

The land capability classification is VIe.

55E—Watt channery silt loam, 25 to 50 percent slopes. This soil is moderately deep, steep and very steep, and somewhat excessively drained. It is on side slopes. Slopes are commonly convex. Shallow to moderately deep drainageways cross the areas at frequent intervals. The areas are long and narrow and range from about 2 to 15 acres.

Typically the surface layer is very dark grayish brown channery silt loam 1 inch thick. The subsurface layer is dark grayish brown channery silt loam 6 inches thick. The subsoil is very dark gray very channery silt loam 9 inches thick. The substratum is extremely channery silt loam 13 inches thick. Bedrock is at a depth of 29 inches.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Buckhall, Lunt, Occoquan, and Quantico soils. Also included are small areas with a surface layer of gravelly silt loam, small areas that are very shallow to rock or have rock outcrop, and small areas that have little or no subsoil. A few areas have moderately deep to deep gullies. Included soils make up about 20 percent of this map unit.

Major soil properties—

Permeability: Moderate to moderately rapid throughout
Available water capacity: Very low
Surface runoff: Very rapid
Erosion hazard: Severe
Organic matter content: Low
Natural fertility: Low
Soil reaction: Extremely acid through strongly acid
Depth of the root zone: 20 to 40 inches, restricted by rock
Depth to bedrock: 20 to 40 inches, soft
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are woodland. A small portion is in pasture.

This soil is very poorly suited to cultivated crops. Slope, droughtiness, and erosion are the main limitations.

This soil is poorly suited to most grasses and legumes. It is poorly suited to alfalfa. The main limitations are droughtiness and slope. The main pasture management practices are weed control, use of lime and fertilizer, use of proper stocking rates, and controlled grazing. Kentucky-31 fescue and ladino clover are common species.

The potential productivity for northern red oak on this soil is moderate. The estimated average annual production of wood per acre is 200 board-feet on the north-facing slopes and 175 board-feet on the south-facing slopes. Tree seeds, cuttings, and seedlings have a high mortality rate because of droughtiness, especially on the south-facing slopes. Slope is the main limitation for harvesting. Placing skid trails on the contour helps to control erosion.

This soil is very poorly suited to building site development and to onsite waste disposal. The depth to bedrock, seepage, slope, and droughtiness are the major limitations.

The land capability classification is VIe.

56A—Waxpool silt loam, 0 to 2 percent slopes. This soil is very deep, level to nearly level, and poorly and somewhat poorly drained. It is on upland flats and ridgecrests and along swales. Slopes are slightly convex to slightly concave. The areas are irregularly rounded to long and narrow and range from approximately 2 to 20 acres.

Typically, the surface layer is very dark grayish brown silt loam 1 inch thick. The subsurface layer is gray silt loam 8 inches thick. The subsoil is 32 inches thick. The upper part of the subsoil is light gray to gray clay loam, the middle part is dark yellowish brown clay, and the lower part is dark yellowish brown clay loam. The substratum extends to a depth of 60 inches or more. It is brownish yellow saprolite that crushes to loamy sand.

Included with this soil in mapping are small areas, generally less than 2 acres each, of Haymarket, Jackland, Legore, and Montalto soils. Included soils make up about 20 percent of this map unit.

Major soil properties—

Permeability: Surface layer—moderate; subsoil—slow to very slow; substratum—moderately rapid
Available water capacity: Moderate
Surface runoff: Slow
Erosion hazard: Slight
Organic matter content: Low to moderate
Natural fertility: Medium
Soil reaction: Surface layer—very strongly acid through moderately acid; subsoil—very strongly acid through neutral; substratum—neutral through moderately alkaline
Depth of the root zone: 6 to 18 inches, restricted by wetness
Depth to bedrock: More than 60 inches
Shrink-swell potential: High
Depth to the seasonal high water table: Surface to 12 inches
Flooding: None

Most areas of this soil are woodland. A few areas are in pasture.

This soil is very poorly suited to cultivated crops and small grains. The main limitation is wetness in spring, fall, and winter. Artificial drainage is needed but is difficult to establish.

This soil is moderately well suited to grasses and legumes that tolerate wet conditions. It is poorly suited to alfalfa. The main management practices are artificial drainage, use of lime and fertilizer, weed control, and controlled grazing. Kentucky-31 fescue, ladino clover, and similar wet-tolerant species are best suited.

The potential productivity for sweetgum on this soil is moderately high. The estimated average annual production of wood per acre is 275 board-feet. Tree seeds, cuttings, and seedlings have a high rate of mortality because of wetness. Planting trees that tolerate wetness helps to overcome this limitation. The major limitation for planting and harvesting is wetness. The soil is soft when wet and does not support heavy harvesting equipment. Harvesting during dry periods helps reduce rutting.

This soil is poorly suited to building site development and to onsite waste disposal. Wetness and low strength limit building site development. Wetness and bedrock limit the soil for onsite waste disposal. If water disposal areas can be located, subsurface drainage can be used to help overcome wetness at building sites. The wetness and slow to very slow permeability in the subsoil are limitations for onsite waste disposal that are difficult to overcome.

The land capability classification is IVw.

Prime Farmland

Prime farmland is one of several kinds of important farmlands defined by the U.S. Department of Agriculture. Identification of prime farmland is a major step in meeting the Nation's needs for food and fiber.

The U.S. Department of Agriculture defines prime farmland as the land that is best suited to producing food, feed, forage, fiber, and oilseed crops. It has the soil quality, growing season, and moisture supply needed to produce a sustained high yield of crops while using acceptable farming methods. Prime farmland produces the highest yields and requires minimal amounts of energy and economic resources, and farming it results in the least damage to the environment.

An area identified as prime farmland must be used for producing food or fiber or must be available for those uses. Thus, urban and built-up land and water areas are not classified as prime farmland.

The general criteria for prime farmland are as follows: a generally adequate and dependable supply of moisture from precipitation or irrigation, favorable temperature and growing-season length, acceptable levels of acidity or alkalinity, few or no rocks, and permeability to air and water. Prime farmland is not excessively erodible, is not saturated with water for long periods, and is not flooded during the growing season. The slope range is mainly from 0 to 6 percent. For more detailed information on the criteria for prime farmland, consult the local staff of the Soil Conservation Service.

The survey area contains about 70,640 acres of prime farmland. That acreage makes up about 35 percent of the total acreage in the survey area and is mainly in the western part.

The soil map units that make up prime farmland in the survey area are listed in table 5. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4, and the location of each unit is shown on the detailed soil maps at the back of this publication. The soil properties and characteristics that affect use and management of the units are described in the section "Detailed Soil Map Units."

Some soils in table 5 are classified as prime farmland if certain limitations of the soil are overcome. The measures needed to overcome the limitations of such soils are given in parentheses after the name of the map unit.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm or sandy soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Fred Diem, extension agent for the Virginia Cooperative Extension Service, helped with the preparation of this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

The 1982 Census of Agriculture lists 51,000 acres of farmland in Prince William County. Of that total, about 34,000 acres is listed as cropland. About three-fourths of those 34,000 acres is harvested cropland; the rest is used for grazing or other purposes. The rest of the farmland consists of woodland, 8,500 acres; permanent pasture, 5,800 acres; and miscellaneous areas—mainly homesites, ponds, and roads— 2,700 acres.

The dominant pasture grasses in the county are tall fescue, orchardgrass, and timothy. They commonly are in mixtures with ladino, white, and red clovers and, in a few areas, alfalfa. Pure stands of alfalfa are on about 1,000 acres. Lime and fertilizer, weed control, and control of insects and diseases in some areas are the main needs of hay and pasture management. The deep, well drained soils in the county are best suited to most of the species of hay and pasture. Many species, however, are suited to a wide range of soils. Further, planting and maintaining hay and pasture on some of the shallower or steeper soils will help to prevent damage from runoff and erosion.

Corn and soybeans are the main row crops, covering some 11,370 acres of the county in 1982, and most areas of those crops consist of deep, moderately well drained to well drained, level to gently sloping soils. To control weed competition, most of the acreage of those crops has been planted in sod or in areas where the native plant cover has been mulched. Some of the other

benefits of these no-till or minimum-till crops are higher yields, less moisture loss, and less erosion.

The common winter grains are wheat, on about 1,500 acres, and barley, on about 270 acres. They mostly are seeded in the fall, after the corn and soybeans have been harvested, in lightly disked soil on which the corn and soybean residue serves as a mulch. After the grains have been harvested, most of those areas are seeded to soybeans in a double-crop sequence.

Much of the acreage in the county is used for sod; nursery stock, vegetables, fruits, berries, and other specialty crops have become common.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland or for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. The levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have slight limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be

partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w*, *s*, or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-4 or IIIe-6.

The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in the yields table.

Woodland Management and Productivity

Woodland covers nearly two-thirds of the county, and woodland owners or managers can use table 7 to plan the use of soils in those and other areas. Only those soils suitable for wood crops are listed in the table. The table gives the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, that the indicator species can produce. The larger the number, the greater the potential productivity. The number 1 indicates low productivity; 2 and 3, moderate; 4 and 5, moderately high; 6 through 8, high; 9 through 11, very high; and 12 or more, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation for use and management. The letter *R* indicates steep slopes; *X*, stones or rocks on the surface; *W*, excessive water in or on the soil; *T*, excessive alkalinity, acidity, sodium salts, or other toxic substances in the soil; *D*, restricted rooting depth caused by bedrock, hardpan, or other restrictive layer; *C*, clay in the upper part of the soil; *S*, sandy texture; and *F*, high content of rock fragments in the soil profile. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, and F.

In table 7, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that erosion can occur as a result of site preparation or following cutting operations and where the soil is exposed, for example, roads, skid trails, fire lanes, and log handling areas. Forests that are abused by fire or overgrazing are also subject to erosion. The ratings for the erosion hazard are based on the percent of the slope and on the erosion factor K shown in table 15. A rating of *slight* indicates that no particular measures to prevent erosion are needed under ordinary conditions. A rating of *moderate* indicates that erosion control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

The proper construction and maintenance of roads, trails, landings, and fire lanes will help overcome the erosion hazard.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that equipment use normally is not restricted either in kind of equipment that can be used or time of year because of soil factors. If soil wetness is a factor, equipment use can be restricted for a period not to exceed 2 months. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If soil wetness is a factor, equipment use is restricted for 2 to 6 months. A rating of *severe* indicates that equipment use is severely restricted either in kind of equipment or season of use. If soil wetness is a factor, equipment use is restricted for more than 6 months.

Choosing the most suitable equipment and timing harvesting and other management operations to avoid seasonal limitations help overcome the equipment limitation.

Seedling mortality refers to the probability of death of naturally occuring or planted tree seedlings as influenced by kinds of soil or topographic conditions. The factors considered in rating the soils for seedling mortality are texture of the surface layer, depth and duration of the water table, rock fragments in the surface layer, rooting depth, and aspect of the slope. A rating of *slight* indicates that under usual conditions the expected mortality is less than 25 percent. A rating of

moderate indicates that the expected mortality is 25 to 50 percent. Extra precautions are advisable. A rating of *severe* indicates that the expected mortality is more than 50 percent. Extra precautions are important. Replanting may be necessary.

The use of special planting stock and special site preparation, such as bedding, furrowing, or surface drainage, can help reduce seedling mortality.

Windthrow hazard is the likelihood of trees being uprooted (tipped over) by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions are a seasonal high water table and bedrock or a fragipan or other limiting layer. A rating of *slight* indicates that normally no trees are blown down by the wind. Strong winds may break trees but do not uproot them. A rating of *moderate* indicates that moderate or strong winds occasionally blow down a few trees during periods of soil wetness. A rating of *severe* indicates that moderate or strong winds may blow down many trees during periods of soil wetness.

The use of specialized equipment that does not damage surficial root systems during partial cutting operations can help reduce windthrow. Care in thinning or no thinning also can help reduce windthrow.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Common trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The *productivity class*, a number, represents an expected volume produced by the most important trees. This number, expressed as cubic meters per hectare per year, indicates the amount of fiber produced on a fully stocked, even-aged, unmanaged stand. One cubic meter per hectare equals 14.3 cubic feet per acre.

The first tree species listed under common trees for a soil is the indicator species for that soil. The indicator species is the species that is common in the area and is generally the most productive on the soil. The productivity class of the indicator species is the number used for the ordination symbol.

Trees to plant are those that are suited to the soil and are planted for commercial wood production.

Recreation

The soils of the survey area are rated in table 8 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 8, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 8 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of construct ng campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking

areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 9, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, sorghum, soybeans, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are tall fescue, orchardgrass, and clover.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are goldenrod, beggartick, pokeberry, and ragweed.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, birch, cherry, maple, apple, hawthorn, dogwood, hickory, blackberry, and muscadine. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are gray dogwood, autumn-olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil

properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, swamps, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, mourning dove, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, gulls, herons, shore birds, muskrat, and frogs.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a

special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost-action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 11 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 11 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which

effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a fragipan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 11 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a fragipan, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, sandy layers, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 11 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a fragipan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is

evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and embankments, dikes, and levees. The limitations are considered *slight* if soil properties and

site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations, and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by soil texture, depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 14 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (*1*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-

weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weignt percentage.

Percentage (of soil particles) passing designated sieves s the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respect vely. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^1/_3$ bar moisture tension. Weight is determined after drying the soil at 105° C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 15, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

Some soils in table 16 are assigned to two hydrologic soil groups because the soils are less than 20 inches deep to bedrock. In those instances the first letter applies to areas where the bedrock is cracked and pervious and the second letter to areas where the bedrock is impervious or where exposed bedrock makes up more than 25 percent of the surface of the soil.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflowing streams, by runoff from adjacent slopes, or by inflow from high tides. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

Table 16 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable period of occurrence are estimated. Frequency generally is expressed as *none, rare, occasional, common,* or *frequent. None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (there is a near 0 to 5 percent chance of flooding in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (there is a 5 to 50 percent chance of flooding in any year). *Frequent* means that flooding occurs often under normal weather conditions (there is more than a 50 percent chance of flooding in any year). *Common* is used when classification as occasional or frequent does not affect interpretations. Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that floods are most

likely to occur is expressed in months. November-May, for example, means that flooding can occur during the period November through May. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely, thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons, which are characteristic of soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely, grayish colors or mottles in the soil. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table, that is, *perched, artesian,* or *apparent;* and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in table 16.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An *artesian* water table is under hydrostatic head, generally below an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

The two numbers in the "High water table—Depth" column indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of aggregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when the moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*4*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 17 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aquic*, meaning water, plus *udult*, from Udultisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplaquents (*Hapl*, meaning minimal horizonation, plus *aquent*, the suborder of the Entisols that has an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Haplaquents.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, mesic Aquic Hapludults.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual* (*3*). Many of the technical terms used in the descriptions are defined in *Soil Taxonomy* (*4*). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Aden Series

The soils of the Aden series are very deep and poorly drained. They formed in alluvial sediments dominantly washed from soils of the Triassic area. The soils are on low stream terraces of the Piedmont Plateau. Slopes range from 0 to 2 percent.

The Aden soils commonly are near the Bermudian and Rowland soils on the flood plain and the Arcola, Nestoria, and Reaville soils on the uplands. The Aden soils have gray near the surface and are not flooded so often as the Bermudian and Rowland soils. The Arcola, Nestoria, and Reaville soils have bedrock at a depth of less than 40 inches.

Typical pedon of Aden silt loam, 0 to 2 percent slopes, about 1,000 feet east of Route 611 and about 1,200 feet north of Cedar Run:

Oi—1 inch to 0; partially decomposed leaves, pine needles, and twigs.

Ap—0 to 8 inches; light yellowish brown (10YR 6/4) silt loam; many medium and fine distinct light gray (10YR 7/1) and very pale brown (10YR 7/3) mottles; moderate fine granular structure; friable, slightly sticky; many fine, medium, and coarse roots; 1 percent subrounded quartz gravel; strongly acid; abrupt smooth boundary.

Btg—8 to 14 inches; light gray (10YR 7/1) silty clay loam; many medium distinct light brownish gray (10YR 6/2) and brownish yellow (10YR 6/6) mottles; moderate fine subangular blocky structure; firm, slightly plastic, sticky; many fine, medium, and coarse roots; 1 percent subrounded quartz gravel; few distinct clay films on ped faces; common iron-manganese streaks and concretions; strongly acid; clear smooth boundary.

Bt1—14 to 31 inches; strong brown (7.5YR 5/6) clay; common medium and fine prominent light gray (10YR 7/1) and pinkish gray (7.5YR 6/2) mottles; moderate medium subangular blocky structure; firm, plastic, sticky; fine and medium roots; many iron-manganese concretions and streaks; common distinct and prominent clay films on ped faces; 1 percent subrounded quartz gravel; very strongly acid; gradual smooth boundary.

Bt2—31 to 58 inches; reddish brown (5YR 4/4) silty clay loam; common fine and medium distinct pinkish gray (7.5YR 6/2) mottles; weak medium and fine subangular blocky structure; firm, slightly plastic, sticky; few fine roots; few distinct clay films on faces of peds; 1 percent subrounded quartz gravel; many medium iron-manganese concretions and streaks; very strongly acid; gradual smooth boundary.

C—58 to 78 inches; mottled pinkish gray (5YR 6/2), yellowish red (5YR 5/8), and yellowish brown (10YR 5/8) silt loam; structureless; friable, slightly sticky; common medium iron-manganese concretions and streaks; few fine mica flakes; 1 percent siltstone gravel; very strongly acid; abrupt smooth boundary.

Cr—78 inches; partially weathered red (2.5YR 5/6) siltstone with light gray (10YR 7/1) clay coatings in crevices.

The solum thickness ranges from 40 inches to at least 60 inches. The depth to bedrock is more than 5 feet. Rock fragments of quartz gravel and siltstone make up 1 to 5 percent of the solum and 1 to 15 percent of the C horizon. The soil is strongly acid or very strongly acid unless limed.

The A or Ap horizon has hue of 7.5YR or 10YR, value of 4 or 6, and chroma of 3 or 4. Low-chroma mottling is common. The A horizon is silt loam.

Some pedons have an E horizon that is neutral or has hue of 7.5YR through 2.5Y, value of 5 through 7, and chroma of 0 through 4. It is silt loam.

The B horizon has hue of 5YR through 10YR, value of 4 through 7, and chroma of 1 through 6. It is clay loam, silty clay loam, silty clay, or clay.

The C horizon is neutral or has hue of 5YR through 10YR, value of 5 through 7, and chroma of 0 through 8. It is silt loam, loam, or fine sandy loam.

The Cr horizon is partially weathered siltstone, sandstone, or conglomerate of the Triassic area of the Piedmont Plateau.

Airmont Series

The soils of the Airmont series are very deep and moderately well drained. They formed partly in slope creep and partly in residuum from quartzite and micaceous phyllite rock. Airmont soils are on ridgecrests and side slopes of Bull Run Mountain. Slopes range from 2 to 50 percent.

The Airmont soils commonly are near the Braddock, Stumptown, and Weverton soils. None of those nearby soils has a fragipan.

Typical pedon of Airmont very flaggy loam, in an area of Airmont-Weverton complex, 15 to 25 percent slopes, 9 yards west of a roadbank on Bull Run Mountain, approximately 1.6 miles north of the junction of Logmill Road and Youngs Drive:

Oi—1 inch to 0; partially decomposed hardwood leaves and twigs.

A—0 to 1 inch; dark grayish brown (10YR 4/2) very flaggy loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; 40 percent quartzite flagstones; very strongly acid; clear smooth boundary.

E—1 to 11 inches; light yellowish brown (10YR 6/4) very flaggy loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; few fine and medium mica flakes; 40 percent quartzite flagstones and channers; very strongly acid; clear smooth boundary.

Bt—11 to 27 inches; strong brown (7.5YR 5/6) very flaggy clay loam; weak fine subangular blocky structure; friable; many fine and medium roots; common fine pores; few distinct clay films on ped faces; common fine and medium flakes of mica; 40 percent quartzite flagstones and channers; very strongly acid; clear smooth boundary.

Bx—27 to 45 inches; brownish yellow (10YR 6/6) very flaggy loam; many medium and fine faint pale brown (10YR 6/3) and distinct strong brown (7.5YR 5/6) mottles; coarse prismatic structure parting to weak medium platy; firm to very firm and brittle; common fine and medium mica flakes; common fine and medium pores; 55 percent quartzite flagstones and channers; very strongly acid; clear smooth boundary.

C—45 to 65 inches; brownish yellow (10YR 6/6) extremely flaggy clay loam; common medium and coarse yellowish red (5YR 5/6), strong brown (7.5YR 5/6), and pale brown (10YR 6/3) mottles; massive; compact in place, very friable when displaced; common and medium mica flakes; 65 percent quartzite flagstones; very strongly acid.

The solum thickness ranges from 30 to 60 inches. The depth to the fragipan ranges from 16 to 40 inches. The depth to hard bedrock is more than 60 inches. Rock fragments of angular quartzite flagstone and channers make up 35 to 55 percent of the A and Bt horizons and 35 to 70 percent of the Bx and 2C horizons. In some pedons mica flakes are few, fine, and medium in the A, E, and Bt horizons and common, fine, and medium in the Bx and C horizons. The soil is very strongly acid or strongly acid unless limed.

The A horizon has hue of 10YR, value of 4 through 6, and chroma of 2 through 6. The A horizon is loam or sandy loam in the fine earth fraction.

The E horizon has hue of 10YR, value of 4 through 6, and chroma of 3 through 6. The E horizon is loam or sandy loam in the fine earth fraction.

The Bt horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 through 8. In some pedons low chroma mottles are 24 inches below the top of the argillic horizon. The Bt horizon is loam, sandy clay loam, or clay loam in the fine earth fraction.

The Bx horizon has hue of 10YR, value of 5 or 6, and chroma of 6. Mottles are common in shades of brown, yellow, and white. The Bx horizon is sandy loam or loam in the fine earth fraction.

The 2C horizon commonly is multicolored in shades of brown, red, yellow, and white. It is loam or clay loam in the fine earth fraction.

Albano Series

The soils of the Albano series are deep and poorly drained. They formed in local alluvium and residuum weathered from Triassic red beds of shale, siltstone, and sandstone. They are on upland flats and in depressions in the Culpeper Basin. Slopes range from 0 to 4 percent.

The Albano soils commonly are near the Arcola, Dulles, Manassas, and Reaville soils. The Albano soils have gray colors and a water table near the surface from November through March, neither of which is typical of those nearby soils.

Typical pedon of Albano silt loam, 0 to 4 percent slopes, about 8 miles north of Nokesville, approximately 1,700 feet north of Route 653 and approximately 2,640 feet east of Route 611:

A—0 to 2 inches; very dark grayish brown (10YR 3/2) silt loam; common fine and medium strong brown (7.5YR 5/6) mottles; moderate fine granular structure; friable; many fine, medium, and coarse roots; few medium and fine iron-manganese concretions; strongly acid; clear smooth boundary.

E—2 to 7 inches; light brownish gray (10YR 6/2) silt loam; common fine and medium strong brown (7.5YR 5/6) mottles; moderate fine granular structure; friable; many fine, medium, and coarse roots; few fine and medium iron-manganese concretions; strongly acid; clear smooth boundary.

Btg1—7 to 14 inches; light gray (10YR 7/1) silty clay loam; common fine and medium brownish yellow (10YR 6/6) mottles; moderate medium subangular blocky structure; firm, slightly plastic, sticky; many fine and medium roots; many faint and distinct clay films on ped faces; common fine and medium vesicular pores; few fine and medium iron-manganese concretions; moderately acid; clear smooth boundary.

Btg2—14 to 28 inches; gray (10YR 5/1) clay; common

fine and medium brownish yellow (10YR 6/6) and yellowish brown (10YR 5/6) mottles; moderate medium and coarse subangular blocky structure; very firm, very plastic, very sticky; common fine and medium roots; many faint and distinct clay films on pressure faces and ped faces; few fine iron-manganese concretions; moderately acid; gradual smooth boundary.

Btg3—28 to 40 inches; very dark gray (7.5YR N 3/0) clay; many medium and coarse strong brown (7.5YR 5/6), reddish brown (5YR 5/4), and light gray (5YR 7/1) mottles; moderate coarse subangular blocky structure; very firm, very plastic, very sticky; few fine and medium roots; few partially weathered siltstone fragments up to 1 inch in diameter; many faint and distinct clay films; few slickensides; slightly acid; abrupt smooth boundary.

Cr—40 to 43 inches; partially weathered reddish brown (5YR 5/4) siltstone; gray (7.5YR N 6/0) clay flows in crevices.

R—43 inches; hard reddish brown (5YR 5/4) Triassic siltstone.

The solum thickness ranges from 20 to 40 inches. The depth to hard bedrock ranges from 40 to 60 inches. The content of shale, sandstone, and siltstone rock fragments ranges from 0 to 5 percent in the solum and 50 to 90 percent in the C horizon. In unlimed areas the soil is very strongly acid through moderately acid in the A horizon and upper part of the B horizon; it is moderately acid through neutral in the lower part of the B horizon and in the C horizon.

The A horizon has hue of 10YR, value of 3 through 6, and chroma of 1 or 2. In cultivated areas the Ap horizon has hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 2 or 3. The A horizon is silt loam or loam.

The E horizon has hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 1 or 2. It is silt loam or loam.

The Bt horizon is neutral or has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 0 through 4. It contains few to many mottles. The Bt horizon is clay, silty clay, or silty clay loam.

The C horizon is clay loam or silt loam in the fine earth fraction. Some pedons do not have a C horizon.

Arcola Series

The soils of the Arcola series are moderately deep and well drained. They formed in material weathered from Triassic and Jurassic interbedded siltstone, shale, and fine-grained sandstone. The Arcola soils are on upland ridgecrests and side slopes in the Culpeper Basin. Slopes range from 2 to 25 percent.

The Arcola soils commonly are near the Albano, Calverton, Nestoria, and Reaville soils. The Arcola soils are not as wet as the Albano, Calverton, or Reaville soils and are deeper to rock than the Nestoria soils.

Typical pedon of Arcola silt loam, 2 to 7 percent slopes, in Manassas Battlefield Park, ¾ mile northwest of the junction of Route 234 and U.S. Routes 29-211, approximately 700 feet northwest of the picnic grounds and 1,500 feet west of Route 234:

Ap—0 to 9 inches; reddish brown (2.5YR 4/4) silt loam; moderate fine granular structure; very friable; many fine and medium roots; 8 percent partially weathered red (2.5YR 4/6) siltstone fragments; very strongly acid; abrupt smooth boundary.

Bt—9 to 22 inches; reddish brown (2.5YR 4/4) gravelly silt loam; weak fine subangular blocky structure; friable, slightly plastic, slightly sticky; common fine roots; many faint and distinct clay films on ped faces; few fine pores; 25 percent partially weathered red (2.5YR 4/6) siltstone fragments; very strongly acid; gradual smooth boundary.

C—22 to 28 inches; reddish brown (2.5YR 4/4) very gravelly silt loam; common medium and coarse distinct red (10R 5/6) mottles; massive; friable; common fine roots; few distinct and prominent clay flows in rock crevices; 40 percent partially weathered red (2.5YR 4/6) siltstone; very strongly acid; abrupt wavy boundary.

Cr—28 to 48 inches; red (2.5YR 4/6) weathered Triassic siltstone; compact and dense in place.

R—48 inches; hard Triassic siltstone.

The solum thickness ranges from 18 to 36 inches. The depth to the Cr horizon ranges from 20 to 40 inches. The depth to bedrock ranges from 40 to 60 inches. Rock fragments of red bed parent material make up 2 to 30 percent of the A or E horizon, 10 to 30 percent of the B horizon, and 35 to 75 percent of the C horizon. The upper part of the solum commonly is locally reworked material. The fine earth fraction of the textural control section is more than 50 percent silt and very fine sand. The soil is very strongly or strongly acid unless limed.

The A or Ap horizon has hue of 10YR, 2.5YR, 5YR, or 7.5YR, value of 3 or 4, and chroma mainly of 2 through 4. Chroma of 2 or less is common in pedons that have a thin A horizon. The A horizon is loam or silt loam in the fine earth fraction.

Some pedons have an E horizon that has hue of

10YR, 2.5YR, or 5YR, value of 3 through 5, and chroma of 3 or 4. It is silt loam or loam in the fine earth fraction.

The Bt horizon has hue of 10YR, 2.5YR, or 5YR, value of 3 or 4, and chroma of 3 or 4. It is a silt loam or silty clay loam in the fine earth fraction.

The C horizon has hue of 10R or 2.5YR, value of 3 or 4, and chroma of 3 or 4. It is loam or silt loam in the fine earth fraction.

The Cr horizon is dense in place but is well weathered red beds of variable grain size and thickness. It generally can be excavated with standard hand equipment. The bedrock cannot be penetrated easily with standard hand augers.

Baile Series

The soils of the Baile series are very deep and poorly drained. They formed in colluvium or local alluvium over residuum from acid crystalline rocks. Baile soils are in depressional areas and on toe slopes of the Piedmont Plateau. Slopes range from 0 to 4 percent.

The Baile soils commonly are near the Buckhall, Elioak, Glenville, and Meadowville soils. The Baile soils have gray colors and a seasonal water table near the surface, which is not typical of those nearby soils. The Baile soils have less clay than the Elioak or Buckhall soils.

Typical pedon of Baile loam, 0 to 4 percent slopes, 1 mile east of Route 234, about ¾ mile north of Hoadly Road, about 200 feet east of the subdivision street junctions, and about 125 feet north of the street:

Oi—1 inch to 0; partially decomposed hardwood leaves and twigs.

A—0 to 2 inches; very dark grayish brown (10YR 3/2) loam; moderate fine granular structure; very friable; few fine mica flakes; many fine, medium, and coarse roots; extremely acid; clear smooth boundary.

E—2 to 8 inches; grayish brown (10YR 5/2) loam; few fine and medium light gray (10YR 7/1) mottles; moderate fine granular structure; very friable; many fine, medium, and coarse roots; 2 percent fine angular quartz gravel up to 2 inches in diameter; few fine mica flakes; extremely acid; clear smooth boundary.

Btg1—8 to 17 inches; light gray (10YR 7/1) clay loam; common fine and medium brownish yellow (10YR 6/6) and few strong brown (7.5YR 5/6) mottles; moderate fine and medium subangular blocky structure; firm, slightly plastic, slightly sticky; common fine and medium roots; common distinct clay films on ped faces; 2 percent angular quartz gravel up to 2 inches in diameter; few fine mica flakes; extremely acid; clear smooth boundary.

Btg2—17 to 33 inches; light gray (10YR 7/1) sandy clay loam; few fine and medium yellow (10YR 7/6) mottles; moderate medium subangular blocky structure; friable, slightly plastic; few fine roots; common fine mica flakes; 2 percent angular quartz gravel up to 2 inches in diameter; many common distinct clay films and sandy coatings on ped faces; lower 3 inches is 20 percent angular quartz gravel and cobbles; very strongly acid; abrupt smooth boundary.

2BCtg—33 to 45 inches; white (10YR 8/1) sandy clay loam; few very pale brown (10YR 8/4) mottles; weak medium subangular blocky structure; friable, slightly plastic; few distinct clay films on ped faces; 2 percent angular quartz gravel; many fine mica flakes; very strongly acid; clear smooth boundary.

2C—45 to 62 inches; white (10YR 8/1) sandy loam; few fine and medium very pale brown (10YR 8/4) and yellow (10YR 7/8) mottles; massive; very friable; strongly weathered granite gneiss; many fine and medium mica flakes; 1 percent quartz gravel up to 1 inch in diameter; very strongly acid.

The solum thickness ranges from 30 to 50 inches. The depth to bedrock is greater than 60 inches. Rock fragments of angular to subrounded quartz gravel commonly make up 0 to 10 percent of the solum and up to 50 percent of thin layers at the lithologic discontinuity. Few to many mica flakes are in the B and C horizons. The soil is extremely acid through strongly acid unless limed.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is sandy loam, loam, silt loam, or silty clay loam.

The E horizon has hue of 10YR, value of 4 through 6, and chroma of 1 or 2. It is sandy loam, loam, silt loam, or silty clay loam.

The B horizon is neutral or has hue of 10YR, 2.5Y or 5Y, value mainly of 4 through 7, and chroma mainly of 0 through 3. The 2B horizon includes value of 8. Higher chroma mottling is common. The B horizon is loam, silty clay loam, sandy clay loam, or clay loam.

The C horizon has hue of 10YR or yellower with low value and chroma dominant. Mottling with high value and chroma is common. The C horizon is sandy loam, loam, or silt loam. It commonly is strongly weathered acid gneiss or schist and includes stratified sediments in a few places.

Bermudian Series

The soils of the Bermudian series are very deep and well drained. They formed in alluvium washed from silty materials of the Triassic red beds of the Piedmont Plateau. They are on low flood plains of the major streams of the county, such as Bull, Broad, Cedar, Kettle, and Slate Runs. Slopes range from 0 to 2 percent.

The Bermudian soils commonly are near the Arcola, Nestoria, and Panorama soils. The Bermudian soils are flooded more often than those soils.

Typical pedon of Bermudian silt loam, 0 to 2 percent slopes, approximately 200 feet east of Route 611 and 50 feet north of Slate Run:

Ap—0 to 12 inches; dark reddish brown (5YR 3/4) silt loam; moderate fine granular structure; friable; many fine roots; strongly acid; abrupt smooth boundary.

Bw1—12 to 22 inches; dark reddish brown (5YR 3/4) silt loam; weak fine subangular blocky structure; friable; many fine roots; strongly acid; clear smooth boundary.

Bw2—22 to 38 inches; reddish brown (5YR 5/4) to dark reddish brown (5YR 3/3) silt loam; few fine red (2.5YR 5/6) mottles; weak medium subangular blocky structure; friable; common fine roots; 10 percent siltstone fragments up to 1 inch in diameter in the lower 3 inches; strongly acid; abrupt smooth boundary.

2C—38 to 64 inches; reddish brown (5YR 5/3) channery silty clay loam; massive; friable, slightly sticky, slightly plastic; few fine roots; 25 percent shale fragments up to 1 inch in diameter; moderately acid; abrupt smooth boundary.

2R—64 inches; red fractured siltstone.

The solum thickness ranges from 34 to 52 inches. The depth to bedrock is more than 60 inches. The content of rock fragments of red shale ranges from 0 to 20 percent in the B horizon and from 5 to 80 percent in the C horizon. The soil is very strongly acid through moderately acid.

The A horizon has hue of 2.5YR, 5YR, or 7.5YR, value of 3 through 5, and chroma of 2 through 4. It is silt loam.

The B horizon has hue of 7.5YR, 5YR, or 2.5YR, value of 3 through 5, and chroma of 3 or 4. It is loam, silt loam, or silty clay loam in the fine earth fraction.

The C horizon has colors similar to those of the B horizon and textures ranging from sandy loam through silty clay loam in the fine earth fraction.

Braddock Series

The soils of the Braddock series are very deep and well drained. They formed in colluvial materials or old alluvium on foot slopes and mountain toe slopes of the Piedmont Plateau. Slopes range from 7 to 15 percent.

The Braddock soils commonly are near the Airmont, Oakhill, Oatlands, Montalto, Stumptown, Weverton, and Sudley soils. All of those nearby soils formed in residuum. The Braddock soils are deeper to bedrock than the Oakhill, Stumptown, or Oatlands soils.

Typical pedon of Braddock loam, 7 to 15 percent slopes, on Falkland Farm about 1 mile northwest of Routes 29-211 at Broad Run and about 1,200 feet northeast of the manor house:

Ap—0 to 8 inches; strong brown (7.5YR 5/6) loam; moderate fine granular structure; very friable; many fine and medium roots; 5 percent rounded and subrounded quartzite gravel; strongly acid; abrupt smooth boundary.

Bt1—8 to 34 inches; red (2.5YR 4/6) clay; moderate fine and medium subangular blocky structure; firm, plastic, sticky; few fine roots; 6 percent rounded and subrounded quartzite gravel; few distinct clay films on ped faces; strongly acid; clear smooth boundary.

Bt2—34 to 55 inches; red (2.5YR 4/6) clay; few distinct medium and coarse brownish yellow (10YR 6/8) and yellowish red (5YR 5/6) mottles; moderate fine subangular blocky structure; few fine roots; few and common distinct clay films on ped faces; 10 percent rounded quartzite gravel and 2 percent cobbles; strongly acid; gradual smooth boundary.

Bt3—55 to 69 inches; red (2.5YR 4/6) clay; many medium and coarse brownish yellow (10YR 6/6) and yellowish red (5YR 5/6) mottles; strong fine subangular blocky structure; firm, sticky, plastic; few and common distinct clay films on ped faces; 10 percent rounded and subrounded quartzite gravel and 2 percent cobbles; strongly acid.

The solum thickness ranges from 40 inches to at least 60 inches. The depth to bedrock is more than 60 inches. The thickness of the colluvium ranges mainly from 3 to 12 feet. Rock fragments of quartzite flags and channers and rounded quartzite gravel and cobbles make up 2 to 35 percent of the solum. The soil is very strongly acid or strongly acid unless limed.

The Ap horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 through 6. Some pedons have an A horizon with chroma of 2. The Ap horizon is loam, sandy loam, or clay loam in the fine earth fraction.

Some pedons have an E horizon that has hue of

7.5YR or 10YR, value of 4 through 6, and chroma of 3 through 6. It is loam or sandy loam in the fine earth fraction.

The B horizon has hue mainly of 10R through 5YR, value of 4 or 5, and chroma of 6 through 8. The upper part of the B horizon does not have hue of 10R. Mottling with shades of yellow and brown is common in the lower part of the B horizon. The B horizon is sandy clay, clay loam, or clay in the fine earth fraction.

Some pedons have a C horizon that is commonly variegated in red, yellow, brown, and gray. It is commonly loam or sandy loam but ranges through clay in the fine earth fraction.

Brentsville Series

The soils of the Brentsville series are moderately deep and well drained. They formed in residuum weathered from red Triassic sandstone and conglomerates. They are on upland ridges and side slopes of the Triassic area of the Piedmont Plateau. Slopes range from 2 to 15 percent.

The Brentsville soils commonly are near the Albano, Dulles, Nestoria, and Panorama soils. The Brentsville soils are better drained than the Albano and Dulles soils. They have coarser textured A and B horizons than the Panorama soils and a thicker solum than the Nestoria soils.

Typical pedon of Brentsville sandy loam, 7 to 15 percent slopes, about ½ mile north of Broad Run and about 250 feet west of Route 649:

A—0 to 2 inches; dark reddish brown (5YR 3/3) sandy loam; weak fine granular structure; very friable; many fine, medium, and coarse roots; 3 percent quartz gravel up to ½ inch in diameter; extremely acid; clear smooth boundary.

E—2 to 11 inches; reddish brown (5YR 4/4) sandy loam; weak fine granular structure; very friable; many fine, medium, and coarse roots; 3 percent rounded quartz gravel up to 1 inch in diameter; extremely acid; clear smooth boundary.

Bt—11 to 26 inches; reddish brown (2.5YR 4/4) sandy loam; weak fine and medium subangular blocky structure; very friable, slightly sticky; common fine and medium roots; 3 percent quartz gravel up to ½ inch in diameter; few distinct clay films; few fine pores; extremely acid; gradual wavy boundary.

C—26 to 34 inches; dusky red (10R 3/3) sandy loam; massive; very friable; few fine roots; 5 percent rounded quartz gravel up to ½ inch in diameter; extremely acid; abrupt wavy boundary.

Cr—34 to 38 inches; dusky red (10R 3/3) weathered medium-grain Triassic sandstone; compact and slightly brittle in place.

R—38 inches; hard medium-grain red (10R 3/3) Triassic sandstone.

The solum ranges from 20 to 40 inches in thickness. The depth to the Cr horizon ranges from 20 to 40 inches, and the depth to hard bedrock ranges from 20 to 40 inches. Rock fragments of rounded quartz gravel and sandstone make up 2 to 20 percent of the A horizon and 2 to 40 percent of the Bt horizon. Rock fragments make up 15 to 35 percent of the C horizon. The soil ranges from extremely acid through very strongly acid unless limed.

The A horizon has hue of 2.5YR, 5YR, and 7.5YR, value of 3 through 5, and chroma of 2 through 6. It is sandy loam in the fine earth fraction. Some pedons have an Ap horizon that has hue of 2.5YR, 5YR, or 7.5YR, value of 4 or 5, and chroma of 3 through 6. It is sandy loam or loam in the fine earth fraction.

The E horizon has hue of 2.5YR, 5YR, or 7.5YR, value of 4 or 5, and chroma of 3 through 6. It is sandy loam or loam in the fine earth fraction.

The Bt horizon has hue of 5YR, 2.5YR, or 10R, value of 3 through 5, and chroma of 3 or 4. It is sandy loam or loam in the fine earth fraction.

The C horizon has hue of 5YR, 2.5YR, or 10R, value of 3 through 5, and chroma of 3 or 4. It is sandy loam or loam in the fine earth fraction.

The Cr horizon is dense in place but is well weathered, red sandstone that can be dug with hand tools.

The R horizon is hard, red Triassic sandstone not removable with hand equipment.

Buckhall Series

The soils of the Buckhall series are very deep and well drained. They formed in materials weathered from granite and granite gneiss and in some places schist. The soils are on uplands of the Piedmont Plateau. Slopes range from 2 to 25 percent.

The Buckhall soils commonly are near the Fairfax, Hoadly, and Occoquan soils. The Buckhall soils do not have the lithologic discontinuity typical of the Fairfax soils, do not have the seasonal high water table or the fragipan typical of the Hoadly soils, and have a thicker solum than the Occoquan soils.

Typical pedon of Buckhall loam, 2 to 7 percent slopes, in Prince William Forest Park about 600 feet north of Park Central Road and about 85 feet east of Bruma Road:

Oi—1 inch to 0; partially decomposed hardwood leaves, pine needles, and twigs.
A—0 to 1 inch; dark grayish brown (10YR 4/2) loam; moderate fine and very fine granular structure; very friable; many fine, medium, and coarse roots; 2 percent angular quartz gravel; very strongly acid; clear smooth boundary.
E—1 to 7 inches; light yellowish brown (10YR 6/4) loam; moderate fine and very fine granular structure; very friable; many fine, medium, and coarse roots; 2 percent angular quartz gravel up to 3 inches in diameter; very strongly acid; clear smooth boundary.
BEt—7 to 12 inches; brownish yellow (10YR 6/6) clay loam; moderate fine and very fine subangular blocky structure; firm, slightly plastic; common fine and medium roots; few distinct patchy clay films on ped faces; 1 percent angular quartz gravel; few fine mica flakes; very strongly acid; clear smooth boundary.
Bt—12 to 30 inches; strong brown (7.5YR 5/6) clay; moderate fine and medium subangular blocky structure; firm, plastic; common fine roots; few distinct clay films on ped faces; 1 percent angular quartz gravel; common fine mica flakes; strongly acid; gradual smooth boundary.
BCt—30 to 43 inches; strong brown (7.5YR 5/6) clay; many fine and medium brownish yellow (10YR 6/8), reddish yellow (5YR 6/8), and pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; firm, slightly plastic; few fine roots; many distinct clay films on ped faces; 1 percent angular quartz gravel; common fine mica flakes; strongly acid; gradual smooth boundary.
C—43 to 72 inches; reddish yellow (7.5YR 6/8) strongly weathered granite gneiss that crushes to sandy loam; many fine medium distinct mottles in shades of red, white, brown, and yellow; massive; very friable; few fine roots; many fine mica flakes; 1 percent angular quartz gravel; very strongly acid.

The solum thickness ranges from 25 inches to at least 50 inches. The depth to bedrock is more than 60 inches. The substratum is saprolite from granite gneiss or schist commonly many feet thick. The content of rock fragments of angular vein quartz gravel is 0 to 15 percent. This soil is very strongly acid or strongly acid unless limed.

The A horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 0 through 3. It is loam, sandy loam, or sandy clay loam. Some pedons have an Ap horizon that is clay loam or sandy clay loam in eroded areas. It has value of 5 through 7 and chroma of 4 or 6.

The E horizon has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 3 through 6. It is loam, sandy loam, or coarse sandy loam.

The Bt horizon has hue of 5YR, 7.5YR or 10YR, value of 5 or 6, and chroma of 4 through 8. It is clay loam or clay. The texture range of the BE and BC horizons includes loam and sandy clay loam. Parent material mottling in shades of brown, red, yellow, and white is common in the lower part of the horizon.

The C horizon is saprolite weathered from granite, granite gneiss, or schist and is commonly multicolored in shades of red, yellow, brown and white. It is loam, sandy loam, sandy clay loam, or clay loam.

Calverton Series

The soils of the Calverton series are deep and moderately well drained and somewhat poorly drained. They formed in material weathered from Triassic red beds of the Piedmont Plateau. Calverton soils are on broad upland ridgecrests. Slopes range from 0 to 7 percent.

The Calverton soils commonly are near the Albano, Nestoria, Panorama, and Reaville soils. None of those nearby soils has a fragipan.

Typical pedon of Calverton silt loam, 0 to 7 percent slopes, approximately 600 feet west of Route 608 and 420 yards northwest of the junction of Routes 608 and 646:

A—0 to 2 inches; dark grayish brown (10YR 4/2) silt loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; 1 percent quartz gravel; very strongly acid; clear smooth boundary.
E—2 to 10 inches; very pale brown (10YR 7/4) silt loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; 1 percent quartz gravel; very strongly acid; clear smooth boundary.
Bt—10 to 19 inches; brownish yellow (10YR 6/6) silty clay loam; few fine and medium light gray (10YR 7/2) mottles; weak fine subangular blocky structure; friable, slightly plastic, slightly sticky; common fine, medium, and coarse roots; many fine pores; few distinct clay films on ped faces; 1 percent subrounded quartz gravel; very strongly acid; abrupt smooth boundary.
Bx—19 to 29 inches; brownish yellow (10YR 6/6) silt loam; many fine, medium, and coarse light gray (10YR 7/1) mottles and common fine and medium

strong brown (7.5YR 5/8) mottles; strong medium platy structure; very firm; common fine pores; few thin clay films on lateral faces; 1 percent subrounded quartz gravel; very strongly acid; gradual smooth boundary.

2B't—29 to 55 inches; red (2.5YR 4/8) silty clay; few fine and medium light gray to gray (10YR 6/1) mottles; moderate fine and medium subangular blocky structure; firm, plastic, sticky; few and common distinct clay films on ped faces; few very fine mica flakes; 8 percent partially weathered fragments of siltstone; extremely acid; gradual smooth boundary.

2Cr—55 to 65 inches; red (2.5YR 4/6) weathered siltstone that crushes to silty clay; loam; massive; friable; few pale brown (10YR 6/3) and light gray (10YR 7/1) clay coatings in crevices; extremely acid; clear smooth boundary.

2R—65 inches; partially weathered Triassic siltstone.

The solum thickness is 35 to 60 inches. The depth to rippable bedrock is 40 to 60 inches. The depth to the fragipan is 10 to 30 inches. Rock fragment content ranges from 0 to 15 percent in the solum and from 40 to 80 percent in the C horizon. The soil is extremely acid through strongly acid unless limed.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 1 through 3. Some pedons have an Ap horizon that has hue of 2.5Y and value of 5. The A horizon is fine sandy loam, sandy loam, loam, or silt loam.

The E horizon has hue of 10YR and 2.5Y, value of 5 through 7, and chroma of 3 through 6. The E horizon is fine sandy loam, sandy loam, loam, or silt loam.

The Bt and Bx horizons have hue of 7.5YR through 2.5Y, value of 5 through 7, and chroma of 4 through 8. High- and low-chroma mottles are common. The Bt horizon is silty clay loam or silt loam. The Bx horizon is silty clay loam, silt loam, clay loam, or sandy clay loam. In some pedons a 2Bt, Bt, or BC horizon is below the Bx horizon. They have colors and textures similar to those of the Bt horizon above the Bx horizon, but the 2Bt horizon includes hue of 2.5YR and texture of silty clay.

The 2C or C horizon is variegated with browns, grays, reds, and yellows. It has strongly weathered siltstone or sandstone fragments and loamy or clayey material between the fragments.

Catlett Series

The soils of the Catlett series are shallow and well drained. They formed in materials weathered from hornfels and granulite of the Triassic area of the Piedmont Plateau. Slopes range from 2 to 25 percent.

The Catlett soils commonly are near the Arcola, Nestoria, Panorama, and Sycoline soils. The depth to bedrock in the Catlett soils is shallower than in the Arcola, Panorama, and Sycoline soils. The Catlett soils have chroma of 2 or less in the B horizon, and the Nestoria soils have chroma of more than 2 in the B horizon.

Typical pedon of Catlett gravelly silt loam, in an area of Catlett-Sycoline complex, 7 to 15 percent slopes, about 500 feet south of the junction of Route 28 and Aden Road:

Oi—1 inch to 0; partially decomposed hardwood leaves, pine needles, and twigs.

A—0 to 1 inch; dark brown (10YR 3/3) gravelly silt loam; moderate fine granular structure; very friable; many fine roots; 30 percent light gray (10YR 7/1) angular hornfels fragments; very strongly acid; abrupt smooth boundary.

E—1 to 6 inches; dark brown (10YR 4/3) gravelly silt loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; 30 percent light gray (10YR 7/1) angular hornfels fragments; very strongly acid; clear smooth boundary.

Bt—6 to 12 inches; grayish brown (10YR 5/2) very gravelly silt loam; weak subangular blocky structure; friable; many fine and medium and few coarse roots; common fine vesicular pores; few faint clay films; 40 percent light gray (10YR 7/1) and yellowish brown (10YR 5/6) angular hornfels fragments; very strongly acid; clear smooth boundary.

C—12 to 17 inches; multicolored brown, yellow, and gray extremely gravelly silt loam; massive; friable; common fine and medium roots; common fine vesicular pores; 60 percent light gray (10YR 7/1) and yellowish brown (10YR 5/6) angular hornfels gravel; very strongly acid; abrupt irregular boundary.

Cr—17 to 26 inches; partially weathered light gray (10YR 7/1) and yellowish brown (10YR 5/6) hornfels and granulite; 10 percent C horizon material in crevices.

R—26 inches; hard light gray (10YR 7/1) and yellowish brown (10YR 5/6) hornfels and granulite.

The solum thickness and the depth to paralithic contact range from 10 to 20 inches. The depth to hard bedrock ranges from 20 to 40 inches. The rock fragment content of gray, yellow, and brown hornfels or granulite ranges from 15 to 50 percent in the A horizon and from 35 to 75 percent in the B and C horizons. The

soil is very strongly acid or strongly acid.

The A horizon has hue of 10YR, value of 3 through 5, and chroma of 1 through 3. It is silt loam in the fine earth fraction.

The E horizon has hue of 10YR, value of 3 through 5, and chroma of 1 through 3. It is silt loam in the fine earth fraction.

The Bt horizon has hue of 10YR, 2.5Y, or 5Y, value of 3 through 5, and chroma of 1 through 6. The low chroma is inherent from parent rock. The Bt horizon is silt loam in the fine earth fraction.

The color and texture of the C horizon are similar to those of the Bt horizon. The Cr horizon is partially weathered granulite that can be dug with hand tools. The R horizon is hornfels and granulite bedrock.

Codorus Series

The soils of the Codorus series are very deep and moderately well drained and somewhat poorly drained. They formed in alluvium washed from soils formed in material weathered from crystalline rocks of the Piedmont Plateau. They are on low flood plains adjacent to the larger streams, such as the Occoquan River, Powells and Neabsco Creeks, and Broad Run. Slopes range from 0 to 2 percent.

The Codorus soils commonly are near the Comus, Delanco, and Hatboro soils. They are wetter than the Comus soils, are better drained than the Hatboro soils, and have less clay in the subsoil than the Delanco soils.

Typical pedon of Codorus loam, 0 to 2 percent slopes, about 1,000 feet east of Linton Hall School Road, about 600 feet south of Route 619, and about 250 feet west of Broad Run:

Ap—0 to 12 inches; brown to dark brown (7.5YR 4/4) loam; moderate fine granular structure; friable; many fine and medium roots; few fine mica flakes; strongly acid; clear smooth boundary.

Bw1—12 to 16 inches; dark yellowish brown (10YR 4/4) loam; weak fine subangular blocky structure; friable; many fine and medium roots; few fine mica flakes; few fine dark brown to black iron-manganese concretions; strongly acid; clear smooth boundary.

Bw2—16 to 27 inches; dark yellowish brown (10YR 4/4) loam; many medium and coarse light brownish gray (10YR 6/2) and brownish yellow (10YR 6/6) mottles; weak fine and medium subangular blocky structure; friable; few fine mica flakes; 1 percent rounded quartz gravel; few fine dark brown iron-manganese concretions; strongly acid; clear smooth boundary.

Bw3—27 to 42 inches; dark yellowish brown (10YR 4/4) loam; common fine and medium light brownish gray (10YR 6/2) and brownish yellow (10YR 6/6) mottles; weak medium and coarse subangular blocky structure; friable to firm; few fine mica flakes; 1 percent rounded quartz gravel; few dark brown to black iron-manganese concretions; strongly acid, clear smooth boundary.

C—42 to 65 inches; yellowish brown (10YR 5/6) sandy loam; many fine, medium, and coarse light gray (10YR 7/1) and grayish brown (10YR 5/2) mottles; massive; very friable; 3 percent rounded and subrounded quartz gravel; common fine mica flakes; common medium and fine brown to black iron-manganese concretions and streaks; very strongly acid.

The solum thickness ranges from about 30 to 60 inches. The depth to bedrock is more than 5 feet. The content of rock fragments is 0 to 10 percent in the solum and up to 50 percent in individual strata of the C horizon. Few to many mica flakes are throughout the profile. The soil is very strongly or strongly acid unless limed.

The A horizon has hue of 10YR or 7.5YR, value of 3 through 5, and chroma of 2 through 4. It is loam or silt loam.

The B horizon has hue of 7.5YR or 10YR, value of 3 through 6, and chroma of 3 or 4. Low-chroma mottles, indicative of wetness, are within 24 inches of the surface. The B horizon is loam, silt loam, or silty clay loam.

The C horizon is stratified loam, silt loam, sandy loam, loamy sand, or gravelly sand and is mottled in shades of gray, yellow, brown, and red.

Comus Series

The soils of the Comus series are very deep and well drained. They formed in alluvium washed from soils formed dominantly in material weathered from crystalline rocks of the northern part of the Piedmont Plateau. They are on low flood plains of the larger streams, such as the Occoquan River, Powells and Neabsco Creeks, and Broad Run. Slopes range from 0 to 2 percent.

The Comus soils commonly are near the Codorus, Delanco, Elsinboro, and Hatboro soils. They are not as wet as the Codorus and Hatboro soils and are on lower positions and have less clay in the subsoil than the Delanco and Elsinboro soils.

Typical pedon of Comus loam, 0 to 2 percent slopes, about 300 feet east of Linton Hall School Lane, about

200 feet north of Route 619, and about 75 feet east of Broad Run:

Ap—0 to 10 inches, brown to dark brown (7.5YR 4/4) loam; moderate fine granular structure; friable; many fine and medium roots; few mica flakes; strongly acid; clear smooth boundary.

BW1—10 to 28 inches; brown to dark brown (7.5YR 4/4) loam; weak fine subangular blocky structure; friable, slightly sticky; common fine, medium, and coarse roots; few fine mica flakes; strongly acid; clear smooth boundary.

BW2—28 to 39 inches; brown (7.5YR 5/4) loam; weak fine subangular blocky structure; friable, slightly sticky; common fine roots; few fine mica flakes; 1 percent rounded and subrounded quartz and gneissic gravel; strongly acid; clear smooth boundary.

2C1—39 to 51 inches; strong brown (7.5YR 5/6) sandy loam; massive; very friable; few fine roots; common fine and medium mica flakes; 1 percent rounded and subrounded quartz and gneissic gravel; strongly acid; clear smooth boundary.

2C2—51 to 70 inches; dark yellowish brown (10YR 4/6) sandy loam; common fine and medium very dark grayish brown (10YR 3/2) mottles; massive; very friable; few fine roots; common fine and medium mica flakes; 3 percent rounded quartz and gneissic gravel; moderately acid.

The solum thickness ranges from about 24 to 40 inches. The depth to bedrock is more than 60 inches. Waterworn rock fragments make up 0 to 10 percent of the solum and up to 40 percent of individual strata in the C horizon. The soil ranges from very strongly acid through moderately acid unless limed.

The A horizon has hue of 7.5YR or 10YR, value of 3 through 5, and chroma of 1 through 4. It is loam or silt loam.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 through 6. The dominant range in clay content is between 10 and 18 percent. The B horizon is loam or silt loam.

The 2C horizon has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 2 through 6. Low-chroma mottling is at a depth of more than 40 inches in some pedons. The 2C horizon is stratified with gravelly loamy sand to silty clay loam; the coarser textures are at a depth of more than 40 inches.

Delanco Series

The soils of the Delanco series are very deep and moderately well drained. They formed in alluvial materials on low river terraces on the Piedmont Plateau. The soils are subject to rare flooding. Slopes range from 0 to 4 percent.

The Delanco soils commonly are near the Codorus, Comus, Elsinboro, and Hatboro soils. The Delanco soils have an argillic horizon; the Codorus, Comus, and Hatboro soils typically do not. The Delanco soils have gray mottles in the subsoil and a seasonal water table between depths of 12 and 30 inches; the Elsinboro soils typically do not.

Typical pedon of Delanco fine sandy loam, 0 to 4 percent slopes, about 350 feet west of the South Branch of Quantico Creek and about 1,500 feet south-southwest of Quantico Creek, in Prince William Forest Park:

Oi—1 inch to 0; partially decomposed pine needles, hardwood leaves, and twigs.

Ap1—0 to 2 inches; very dark grayish brown (10YR 3/2) fine sandy loam; moderate fine and very fine granular structure; very friable; many fine, medium, and coarse roots; common fine mica flakes; strongly acid; clear smooth boundary.

Ap2—2 to 11 inches; yellowish brown (10YR 5/4) sandy loam; moderate fine and very fine granular structure; very friable; many fine, medium, and coarse roots; common fine mica flakes; strongly acid; clear smooth boundary.

Bt1—11 to 17 inches; yellowish brown (10YR 5/6) loam; moderate fine subangular blocky structure; friable, slightly sticky; common fine and medium roots; few faint clay films on ped faces; common fine mica flakes; few fine iron-manganese concretions; strongly acid; clear smooth boundary.

Bt2—17 to 35 inches; brownish yellow (10YR 6/8) clay loam; few medium and fine light brownish gray (10YR 6/2) mottles; moderate fine subangular blocky structure; friable, slightly plastic, slightly sticky; many fine roots; many distinct clay films on ped faces; common fine mica flakes; strongly acid; clear smooth boundary.

Bt3—35 to 45 inches; brownish yellow (10YR 6/6) sandy clay loam; many fine and medium distinct light gray (10YR 7/1) mottles and few medium strong brown (7.5YR 5/6) mottles; weak fine

subangular blocky structure; very friable, slightly sticky; few fine roots; few distinct clay films on ped faces; common fine mica flakes; very strongly acid; clear smooth boundary.

C—45 to 76 inches; multicolored gray, brown, and yellow stratified alluvial sediments dominantly of sandy loam; lenses of loamy sand and sandy clay loam; massive; very friable; many fine mica flakes; 3 percent rounded quartz gravel; common fine and medium iron-manganese concretions; strongly acid.

The solum thickness ranges from 40 to 60 inches. The depth to bedrock is more than 60 inches. Rock fragments, commonly of rounded quartz gravel, make up 0 to 5 percent of the solum and up to 25 percent of the substratum. Few to many mica flakes are in the B and C horizons. The soil ranges from extremely acid through strongly acid unless limed.

The A horizon has hue of 10YR or 2.5Y, value of 3 through 6, and chroma of 2 through 4. The A horizon is fine sandy loam or silt loam.

Some pedons have an E horizon that has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 through 6. It is fine sandy loam, sandy loam, or loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 6 or 8. It is loam, clay loam, sandy clay loam, silt loam, or silty clay loam.

The C horizon typically is mottled gray, brown, and yellow, stratified sandy to loamy material. Thin clay strata are common in some pedons, and the content of rounded quartz gravel is as much as 25 percent in individual strata.

Dulles Series

The soils of the Dulles series are deep and moderately well drained and somewhat poorly drained. They formed partly in colluvium and partly in residuum from red beds of siltstone, shale, and fine-grained sandstone. These soils are in saddles, on toe slopes, and at the heads of drainageways in the Culpeper Basin of the northern part of the Piedmont Plateau. Slopes range from 0 to 4 percent.

The Dulles soils commonly are near the Albano, Kelly, and Nestoria soils. The Dulles soils are better drained than the Albano soils, do not have the inherited gray colors or rock fragments of hornfels typical of the Kelly soils, and are deeper and not as well drained as the Nestoria soils.

Typical pedon of Dulles silt loam, 0 to 4 percent slopes, in Manassas Battlefield Park, about 1 mile north of Route 292-11, about 120 yards west of Route 234, and 75 yards north of the picnic area road:

Ap—0 to 8 inches; dark brown (7.5YR 4/4) silt loam; moderate fine granular structure; friable; many fine roots; 1 percent rounded and subrounded quartz gravel; very strongly acid; abrupt smooth boundary.

Bt1—8 to 15 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium and fine subangular blocky structure; firm, sticky, slightly plastic; many fine roots; common distinct clay films on ped faces; common fine vesicular pores; 1 percent rounded and subrounded quartz gravel; very strongly acid; clear smooth boundary.

Bt2—15 to 22 inches; yellowish brown (10YR 5/6) silty clay loam; few fine and medium light gray (10YR 7/2) mottles; moderate fine and medium subangular blocky structure; firm, plastic, sticky; many fine roots; common distinct clay films on ped faces; common fine vesicular pores; very strongly acid; clear smooth boundary.

Bt3—22 to 34 inches; yellowish brown (10YR 5/8) silty clay; common light brownish gray (10YR 6/2) and gray to light gray (10YR 7/2) mottles and coatings; moderate fine subangular blocky structure; firm, plastic, sticky; few fine roots; common distinct clay films and silt coatings on ped faces; 1 percent rounded quartz gravel; very strongly acid; clear smooth boundary.

2Btg—34 to 39 inches; light brownish gray (10YR 6/2) clay; many coarse prominent gray to light gray (10YR 6/1), bluish gray (5B 6/1), and dark reddish brown (10YR 3/4) mottles and streaks; moderate coarse subangular blocky structure; firm, plastic, sticky; few fine roots; few distinct clay films on ped faces; 8 percent weathered shale fragments; few weathered red shale stringers up to 4 inches wide; very strongly acid; clear smooth boundary.

2BCtg—39 to 43 inches; light gray (10YR 7/1) clay; many coarse faint light gray to gray (10YR 6/1), bluish green (5B 6/1), and reddish brown (5YR 4/4) mottles and streaks; weak medium subangular blocky structure; firm, very plastic, very sticky; many distinct and prominent clay films on ped faces; 30 to 50 percent partially weathered siltstone fragments and stringers; very strongly acid; abrupt smooth boundary.

2Cr—43 to 59 inches; red (2.5YR 4/6) partially weathered siltstone; gray (5YR 5/1), pinkish gray (5YR 6/2), and greenish gray (5G 6/1) clay coatings on surfaces and in crevices.

R—59 inches; siltstone bedrock.

The solum thickness ranges from 24 to 48 inches. The depth to the Cr horizon ranges from 40 to 50 inches. The depth to hard, red fine grained sandstone, siltstone, or shale bedrock ranges mainly from 40 to 60 inches but is variable. Rock fragments of subrounded quartz make up 0 to 5 percent of the A horizon and upper part of the B horizon. The content of rock fragments of soft to hard, red and reddish brown fine grained sandstone, siltstone, and shale is 5 to 50 percent below the lithologic discontinuity. Rock fragments of hard, residual, red fine grained sandstone, siltstone, or shale make up 25 to 60 percent of the C horizon. The soil is very strongly acid through moderately acid.

The Ap horizon has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 2 through 6. It is silt loam. Some pedons have a thin A horizon that is similar to the Ap horizon.

The Bt horizon has hue of 10YR, value of 5 through 7, and chroma of 4 through 8. The chroma of the 2Bt horizon ranges from 0 through 8. Matrix colors or coarse mottles of red, dark red, or reddish brown are in the lithologic discontinuity and the C horizon. The Bt horizon mainly is silty clay loam or silty clay, but the range includes clay in the lower part.

In most pedons the B horizon rests directly on a Cr horizon. Some pedons have a C horizon that is a transitional zone of thick clay flows in shades of red, gray, olive, and green and variably weathered siltstone, sandstone, or shale.

Dumfries Series

The soils of the Dumfries series are very deep and well drained. They formed in feldspathic sandy sediments of the Coastal Plain. The soils are on narrow ridges and side slopes. Slopes range from 7 to 50 percent.

The Dumfries soils commonly are near the Lunt, Marr, Neabsco, and Quantico soils. The Dumfries soils do not have the high clay content in the control section typical of the Lunt and Quantico soils, do not have the content of quartz sand typical of the Marr soils, and do not have the fragipan typical of the Neabsco soils.

Typical pedon of Dumfries sandy loam, 15 to 25 percent slopes, about 800 feet northwest of Inn Street, about 1 mile north of Route 619, and about 150 feet east of Interstate Highway 95:

Oi—1 inch to 0; partially decomposed hardwood leaves and twigs.

A—0 to 2 inches; dark grayish brown (10YR 4/2) sandy loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; 1 percent rounded quartz gravel; strongly acid; clear smooth boundary.

E—2 to 10 inches; light yellowish brown (10YR 4/2) sandy loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; 1 percent rounded quartz gravel; strongly acid; clear smooth boundary.

Bt1—10 to 23 inches; brownish yellow (10YR 6/8) sandy clay loam; weak fine subangular blocky structure; friable, sticky, slightly plastic; common fine and medium roots; common distinct clay bridges between sand grains; 1 percent rounded quartz gravel; strongly acid; gradual smooth boundary.

Bt2—23 to 29 inches; yellowish brown (10YR 5/8) sandy loam; common fine and medium pale brown (10YR 7/3) mottles; weak fine subangular blocky structure; friable, sticky; common fine and medium roots; common distinct clay bridges between sand grains; 1 percent rounded quartz gravel; strongly acid; gradual smooth boundary.

BC—29 to 35 inches; yellowish brown (10YR 5/8) sandy loam; common fine and medium pale brown (10YR 7/3) and few white (10YR 8/2) mottles; weak fine subangular blocky structure; friable; slightly sticky; few fine roots; strongly acid; diffuse boundary.

C1—35 to 43 inches; very pale brown (10YR 7/4) sandy loam; many coarse mottles and streaks of yellowish brown (10YR 6/8) and few white (10YR 8/2) mottles; massive; very friable, slightly sticky; few fine roots; strongly acid; gradual smooth boundary.

C2—43 to 72 inches; white (10YR 8/2) sandy loam; few fine and medium brownish yellow (10YR 6/6) mottles and streaks; massive; very friable; few lenses of silty clay up to 2 inches thick; few iron-manganese concretions; strongly acid.

The solum thickness ranges from 18 to 40 inches. The depth to bedrock is greater than 20 feet. Rock fragments of rounded quartz gravel make up 1 to 15 percent of the solum and from 0 to 10 percent of the C horizon. Lenses up to 3 inches thick of silty clay are common in the C horizon. The content of feldspar sands ranges from about 25 to 60 percent in the C horizon. The soil is strongly or very strongly acid unless limed.

The A horizon is neutral or has hue of 10YR or 2.5Y, value of 2 through 4, and chroma of 0 through 2. It is sandy loam or loam.

The E horizon has hue of 10YR or 2.5Y, value of 5

through 7, and chroma of 3 through 6. It is sandy loam or loam.

The Bt horizon has hue of 10YR, value of 5 or 6, and chroma of 6 through 8. It is sandy loam, loam, or sandy clay loam. The range in the BC horizon includes loamy sand.

The C horizon has hue of 10YR or 2.5Y, value of 6 through 8, and chroma mainly of 2 through 4. Higher chroma mottles and streaks are common. The C horizon is loamy sand to sandy loam and is 25 to 60 percent feldspar.

Elioak Series

The soils of the Elioak series are very deep and well drained. They formed in material weathered from muscovite mica schist. The soils are on uplands of the northern Piedmont Plateau. Slopes range from about 2 to 15 percent.

The Elioak soils commonly are near Buckhall, Minnieville, Glenelg, Glenville, and Meadowville soils. The Elioak soils typically contain more clay than the Glenelg or Meadowville soils, have a redder subsoil than the Buckhall soils, have a thinner solum and a more friable subsoil than the Cullen soils, and are better drained than the Baile or Glenville soils.

Typical pedon of Elioak loam, 7 to 15 percent slopes, eroded, about 1,320 feet northeast of the Oakridge Campground office, about 2,600 feet south of Quantico Creek, in Prince William Forest Park:

Oi—1 inch to 0; partially decomposed hardwood leaves, pine needles, and twigs.

Ap—0 to 5 inches; brown (7.5YR 5/4) loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; 3 percent angular quartz gravel; common fine mica flakes; very strongly acid; abrupt smooth boundary.

Bt1—5 to 31 inches; red (2.5YR 4/6) clay; moderate fine and very fine subangular blocky structure; firm, slightly plastic; many fine and medium roots; few and common distinct clay films on ped faces; 1 percent angular quartz gravel; many fine mica flakes; strongly acid; gradual smooth boundary.

Bt2—31 to 41 inches; red (2.5YR 5/8) clay; moderate fine and medium subangular blocky structure; friable, slightly plastic; common fine roots; many distinct and permanent clay films on ped faces; 10 percent strongly weathered schist fragments up to 2 inches in diameter; many fine mica flakes; 2 percent angular quartz gravel; strongly acid; clear smooth boundary.

C—41 to 72 inches; weak red (2.5YR 4/2) loam; many fine, medium, and coarse distinct brownish yellow (10YR 6/6) and reddish yellow (5YR 6/8) mottles and streaks; massive; very friable; few medium clay flows in the upper 10 inches; many fine mica flakes; strongly weathered mica schist; strongly acid.

The solum thickness ranges from 30 to 50 inches. The depth to bedrock is more than 10 feet. The content of rock fragments of angular quartz ranges from 0 to 10 percent. The lower part of the B horizon and the C horizon are highly micaceous. The soil is very strongly acid or strongly acid unless limed.

The A horizon has hue of 5YR through 10YR, value of 3 through 5, and chroma of 2 through 4. It is loam, silt loam, or clay loam.

Some pedons have an E horizon that has hue of 5YR, 7.5YR, or 10YR, value of 5 or 6, and chroma of 2 or 4. It is loam, silt loam, or fine sandy loam.

The Bt horizon has hue of 10R through 5YR, value of 3 through 5, and chroma of 4 through 8. It is clay loam, clay, or silty clay.

The C horizon is commonly multicolored in shades of red, brown, yellow, and white. It is loam, fine sandy loam, or silt loam and is strongly weathered mica schist saprolite.

Elsinboro Series

The soils of the Elsinboro series are very deep and well drained. They formed in sediments dominantly derived from schist, gneiss, and granite of the northern Piedmont Plateau. They are on low stream terraces adjacent to flood plains. Flooding is rare. Slopes ranges from 2 to 7 percent.

The Elsinboro soils commonly are near the Codorus, Comus, Delanco, and Hatboro soils. The Elsinboro soils have a thicker solum and a more clayey subsoil than the Codorus, Comus, and Hatboro soils and are flooded less often than those soils. The Elsinboro soils are better drained and have higher value and chroma than the Delanco soils.

Typical pedon of Elsinboro sandy loam, 2 to 7 percent slopes, about 1 mile south of Route 234, about 1,000 feet west of the southernmost cabin in Pleasant Camp No. 4, and about 150 feet west of Quantico Creek, in Prince William Forest Park:

Oi—1 inch to 0; partially decomposed hardwood leaves, pine needles, and twigs.

Ap—0 to 9 inches; dark yellowish brown (10YR 4/4) sandy loam; weak fine and very fine granular structure; very friable; many fine, medium, and

coarse roots; 1 percent rounded quartz gravel; very strongly acid; abrupt smooth boundary.

Bt—9 to 31 inches; strong brown (7.5YR 5/6) sandy clay loam; weak fine and medium subangular blocky structure; friable; many fine and medium roots; few distinct clay films on ped faces and clay bridging between sand grains; 1 percent rounded quartz gravel; common fine mica flakes; very strongly acid; gradual smooth boundary.

BCt—31 to 44 inches; strong brown (7.5YR 5/6) sandy loam; weak fine subangular blocky structure; friable; few fine and medium roots; common distinct clay bridging and coatings on sand grains; 2 percent rounded quartz gravel; many fine mica flakes; very strongly acid; gradual smooth boundary.

C—44 to 65 inches; strong brown (7.5YR 5/6) gravelly sandy loam; few fine and medium distinct light yellowish brown (10YR 6/4), pale brown (10YR 6/3), and light brownish gray (10YR 4/2) mottles; massive; very friable; few fine roots; many fine mica flakes; 15 percent rounded quartz gravel; very strongly acid.

The solum thickness ranges from 35 to 60 inches. The depth to bedrock is more than 60 inches. The content of rock fragments of rounded gravel ranges from 0 to about 5 percent in the surface layer and subsoil and up to 25 percent in the C horizon. Few to many mica flakes are throughout the soil. The soil is very strongly acid or strongly acid unless limed.

The A horizon has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 2 through 4. It is sandy loam, fine sandy loam, loam, or silt loam.

Some pedons have an E horizon that has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 2 through 6. It is sandy loam, fine sandy loam, loam, or silt loam.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 through 8. It is sandy loam, sandy clay loam, clay loam, or loam.

The C horizon has hue of 10YR or 7.5YR, value mainly of 4 or 7, and chroma mainly of 4 through 8. Lower chroma and lower value mottles are common. The C horizon is commonly stratified loamy and sandy sediments.

Fairfax Series

The soils of the Fairfax series are very deep and well drained. They formed partly in unconsolidated sediment of the Coastal Plain and partly in residuum from mica schist and gneiss. Slopes range from 2 to 15 percent.

The Fairfax soils commonly are near the Buckhall, Glenelg, Meadowville, and Neabsco soils. The Fairfax soils have a thicker solum than the Buckhall and Glenelg soils, both of which formed entirely from residual materials from granite gneiss or mica schist. The Fairfax soils are at a higher position on the landscape and are better drained than the Meadowville soils and have less clay than and do not have the fragipan typical of the Neabsco soils.

Typical pedon of the Fairfax loam, 2 to 7 percent slopes, in Prince William Forest Park about 600 feet east of Route 619, about 100 feet south of the fire road, and about 2,200 feet west of the Oak Ridge Campground Office:

Oi—1 inch to 0; partially decomposed hardwood leaves, pine needles, and twigs.

Ap1—0 to 1 inch; very dark grayish brown (10YR 3/2) loam; moderate fine and very fine granular structure; very friable; many fine, medium, and coarse roots; 2 percent rounded and subrounded quartz gravel; strongly acid; abrupt smooth boundary.

Ap2—1 to 8 inches; yellowish brown (10YR 5/4) loam; moderate very fine and fine granular structure; very friable; many fine, medium, and coarse roots; 2 percent rounded and subrounded quartz gravel; strongly acid; abrupt smooth boundary.

Bt1—8 to 14 inches; brownish yellow (10YR 6/8) clay loam; moderate fine and very fine subangular blocky structure; friable, slightly plastic, sticky; many fine, medium, and coarse roots; few distinct clay films on ped faces; 2 percent rounded and subrounded quartz gravel; strongly acid; clear smooth boundary.

B2t—14 to 22 inches; brownish yellow (10YR 6/8) clay; moderate fine subangular blocky structure; friable, slightly plastic, sticky; common fine and medium roots; common distinct clay films on ped faces; 5 percent rounded and subrounded quartz gravel; 1 percent rounded rock fragments 3 to 6 inches in diameter at base of horizon; strongly acid; abrupt smooth boundary.

2Bt3—22 to 46 inches; strong brown (7.5YR 5/8) clay; moderate fine subangular blocky structure; friable; moderately sticky; common distinct clay films on ped faces; 1 percent angular quartz gravel up to 1 inch in diameter; common fine mica flakes; strongly acid; gradual smooth boundary.

2Bt4—46 to 60 inches; yellowish red (5YR 5/6) clay; many fine, medium, and coarse red (2.5YR 5/8), strong brown (7.5YR 5/8), and reddish yellow

(7.5YR 7/8) mottles; weak fine and medium subangular blocky structure; friable; few fine roots; common distinct and prominent clay films on ped faces; common fine mica flakes; 1 percent angular quartz gravel up to 1 inch in diameter; strongly acid; gradual smooth boundary.

2C—60 to 75 inches; multicolored red, brown, yellow, and white clay loam; massive; friable; faint distinct clay flows in crevices; many fine and medium mica flakes; 10 percent partially weathered gneiss fragments up to 5 inches in diameter; strongly acid.

The solum thickness ranges from 40 inches to at least 60 inches. The depth to a lithologic discontinuity is 12 to 36 inches. The depth to bedrock is more than 10 feet. Subangular to subrounded quartz gravel makes up 1 to 5 percent of the surface layer and upper part of the subsoil. A gravel line up to 3 inches thick is at the lithologic discontinuity in some pedons. It ranges from 15 to 25 percent angular and subrounded quartz gravel and cobbles. The content of rock fragments of angular quartz gravel is 0 to 10 percent in the lower part of the subsoil and in the substratum. Few fine mica flakes are in the upper part of the subsoil, and common to many are in the lower part of the subsoil. The substratum is highly micaceous. This soil is very strongly acid or strongly acid unless limed.

Some pedons have an A horizon that has hue of 10YR, value of 3 through 6, and chroma of 2 through 6. It is sandy loam, loam, or silt loam.

Some pedons have an E horizon that has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 through 6. It is sandy loam, fine sandy loam, loam, or silt loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 6 or 8. It is clay loam, silty clay loam, or clay.

The 2B horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 through 6, and chroma of 6 or 8. It is clay loam, silty clay loam, or clay.

The 2C horizon is very strongly weathered mica schist or gneiss multicolored in shades of red, brown, yellow, and white. It is sandy loam, loam, or clay loam. The sand fraction is dominantly muscovite mica.

Featherstone Series

The soils of the Featherstone series are very deep and very poorly drained. They formed in Coastal Plain sediments at an elevation of less than 2 feet. The water table is commonly at the surface, and most areas are subject to ponding. Slopes range from 0 to 1 percent.

The Featherstone soils are commonly near the Dumfries and Marumsco soils, neither of which is subject to high storm tides or ponding.

Typical pedon of Featherstone silt loam, 0 to 1 percent slopes, about ½ mile south of Route 636 and 300 yards east of RF&P Railroad, near Farm Creek:

Oi—2 inches to 0; mosses and partially decomposed organic matter.

A—0 to 14 inches; very dark grayish brown (10YR 3/2) silt loam; structureless; very friable, slightly sticky, slightly plastic; many fine, medium, and coarse roots; many decomposing roots and organic debris; 15 percent organic carbon; strongly acid; clear smooth boundary.

Cg—14 to 38 inches; dark grayish brown (10YR 4/2) loam; many medium and coarse prominent very dark gray (10YR 3/1) mottles; structureless; friable, slightly sticky, slightly plastic; common fine roots; 1 percent fine quartz gravel; strongly acid; abrupt smooth boundary.

C—38 to 72 inches; dark yellowish brown (10YR 4/4) loam; many medium and fine distinct dark gray (10YR 4/1) mottles; structureless; friable, slightly sticky, slightly plastic; few fine roots; 1 percent fine quartz gravel; strongly acid.

Rock fragments of quartz gravel make up 0 to 5 percent of the A horizon and 1 to 10 percent of the C horizon. The depth to bedrock is more than 5 feet. The soil is strongly acid or very strongly acid.

The A horizon is neutral or has hue of 10YR, value of 3 or 4, and chroma of 0 through 3. Organic matter content ranges from 10 to 30 percent. The A horizon is silt loam, mucky loam, or mucky silt loam. It is more than 8 percent clay.

The C horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 1 through 4. It is loam or silt loam.

Gaila Series

The soils of the Gaila series are very deep and well drained. They formed in residuum weathered from quartz muscovite schist of the northern portion of the Piedmont Plateau. Slopes range from 7 to 50 percent.

The Gaila soils are commonly near the Baile, Elioak, Glenelg, and Glenville soils, all of which have a thicker solum than the Gaila soils.

Typical pedon of Gaila sandy loam, 7 to 15 percent slopes, about 3,000 feet northeast of Westgate fire road at entrance to Oak Ridge Campground in Prince William Forest Park, and about 1,500 feet south of Quantico Creek:

Oi—2 inches to 0; partially decomposed hardwood leaves and twigs.
A—0 to 7 inches; dark brown (7.5YR 4/4) sandy loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; 1 percent angular vein quartz gravel; many fine mica flakes; extremely acid; clear smooth boundary.
Bt—7 to 15 inches; strong brown (7.5YR 5/8) sandy clay loam; weak fine and medium subangular blocky structure; friable; many fine and medium roots, few coarse roots; common distinct clay films on ped faces; many fine mica flakes; 1 percent angular vein quartz gravel; very strongly acid; gradual smooth boundary.
C1—15 to 43 inches; multicolored yellow, brown, red, and white sandy loam; massive; very friable; 1 percent angular vein quartz; very micaceous; few fine roots; very strongly acid; gradual smooth boundary.
C2—43 to 72 inches; multicolored yellow, red, brown, and white loamy sand; massive; very friable; few thin vein quartz stringers; very micaceous; 5 percent partially weathered mica schist fragments; very strongly acid.

The solum thickness ranges from 8 to 20 inches. The depth to bedrock is more than 60 inches. The rock fragment content of vein quartz ranges from 0 to 15 percent throughout the profile, and partially weathered muscovite schist fragments make up 0 to 15 percent of the B and C horizons. Reaction ranges from extremely acid through strongly acid.

The A horizon is neutral or has hue of 5YR through 2.5Y, value of 3 through 5, and chroma of 0 through 4. It is loam or sandy loam.

Some pedons have an E horizon that has hue of 7.5YR through 2.5Y, value of 5 through 7, and chroma of 2 through 4. It is loam or sandy loam.

The Bt horizon mainly has hue of 5YR through 10YR, value of 4 through 6, and chroma of 3 through 8. Yellower and redder mottling and streaks are common. The Bt horizon is sandy loam, loam, or sandy clay loam.

The C horizon is commonly multicolored in shades of red, yellow, brown, and white but in a few places has uniform color in one of these shades. It is sandy loam, loamy sand, or loam; the sand fraction is dominantly muscovite mica.

Glenelg Series

The soils of the Glenelg series are very deep and well drained. They formed in material weathered from muscovite mica schist. The soils are on uplands of the northern Piedmont Plateau. Slopes range from about 2 to 25 percent.

The Glenelg soils commonly are near the Buckhall, Elioak, Fairfax, and Gaila soils. The Glenelg soils have a browner subsoil and less clay than the Elioak soils, have a thicker subsoil than the Gaila soils, do not have the Coastal Plain cap typical of the Fairfax soils, and have less clay and more mica than the Buckhall soils.

Typical pedon of Glenelg loam, in an area of Glenelg-Buckhall complex, 7 to 15 percent slopes, approximately 300 feet north of Route 642 and 50 feet west of the eastern boundary of Valley Vue:

A—0 to 2 inches; dark brown (10YR 4/3) loam; weak fine granular structure; very friable; many fine and medium roots; common fine mica flakes; very strongly acid; abrupt smooth boundary.
E—2 to 5 inches; yellowish brown (10YR 5/4) loam; weak fine granular structure; very friable; common medium roots; many fine mica flakes; very strongly acid; clear smooth boundary.
Bt1—5 to 11 inches; brown (7.5YR 5/4) clay loam; weak medium and fine subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and medium roots; many fine mica flakes; few distinct clay films on ped faces; organic stains on ped faces; strongly acid; clear smooth boundary.
Bt2—11 to 20 inches; yellowish red (5YR 5/6) clay loam; moderate medium and fine subangular blocky structure; friable, slightly plastic; common fine roots; many fine mica flakes; common prominent clay films on ped faces; strongly acid; clear wavy boundary.
Bt3—20 to 34 inches; yellowish red (5YR 4/6) sandy clay loam; moderate medium and fine subangular blocky structure; friable, slightly plastic; common fine roots; many fine mica flakes; common prominent clay films on ped faces; strongly acid; gradual wavy boundary.
C—34 to 65 inches; multicolored brown, red, and yellow sandy loam saprolite; massive; very friable; few fine roots; tubular pores to below 65 inches; few thin clay flows; strongly acid.

The solum thickness ranges from 20 to 40 inches. The depth to bedrock is more than 60 inches. The content of angular quartz gravel up to 3 inches in diameter is 0 to 15 percent in the surface layer and 0 to 10 percent in the subsoil and substratum. The soil is very strongly acid or strongly acid unless limed.

The A horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 or 6, and chroma of 1 through 3. The

A horizon is loam or silt loam.

The E horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 through 6, and chroma of 3 or 4. It is loam or silt loam.

The Bt horizon has hue of 5YR or 7.5YR, value of 4 through 6, and chroma of 4 through 8. It is loam, sandy clay loam, clay loam, or silty clay loam. The sand fraction is dominantly mica.

The C horizon is strongly weathered mica schist and is commonly variegated in shades of red, yellow, brown, and white. It is sandy loam or silt loam. The sand fraction is dominantly mica.

Glenville Series

The soils of the Glenville series are very deep and moderately well drained and somewhat poorly drained. They formed partly in colluvium and partly in residuum from muscovite mica schist. The soils are in depressions, along drainageways, on toe slopes, and in saddles in the northern part of the Piedmont Plateau. Slopes range from 0 to 4 percent.

The Glenville soils commonly are near the Baile, Buckhall, and Elioak soils. None of those nearby soils typically has the seasonal high water table or the gray mottles typical of the Glenville soils. The Glenville soils have less clay than the Buckhall or Elioak soils.

Typical pedon of Glenville loam, 0 to 4 percent slopes, about 900 feet north of Hoadly Road and about 90 feet east of Valleyvue Drive:

Oi—1 inch to 0; partially decomposed hardwood leaves and twigs.

A—0 to 2 inches; very dark grayish brown (10YR 3/2) loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; few fine mica flakes; 1 percent angular quartz gravel; very strongly acid; clear smooth boundary.

E—2 to 8 inches; yellowish brown (10YR 5/4) loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; few fine mica flakes; 1 percent angular quartz gravel; very strongly acid; clear smooth boundary.

Bt1—8 to 13 inches; yellowish brown (10YR 5/6) clay loam; moderate fine subangular blocky structure; friable; many fine and medium roots; common fine mica flakes; many distinct clay films on ped faces; 1 percent angular quartz gravel; very strongly acid; clear smooth boundary.

Bt2—13 to 18 inches; brownish yellow (10YR 6/8) clay loam; moderate fine subangular blocky structure; friable; many fine and medium roots; common fine mica flakes; many distinct clay films on ped faces; 1 percent angular quartz gravel; very strongly acid; clear smooth boundary.

Bt3—18 to 22 inches; brownish yellow (10YR 6/8) clay loam; common medium and coarse light brownish gray (10YR 6/2) mottles; moderate fine subangular blocky structure; friable; many fine and medium roots; common fine flakes of mica; many distinct clay films on ped faces; 1 percent angular quartz gravel; very strongly acid; abrupt smooth boundary.

Bx—22 to 32 inches; brownish yellow (10YR 6/6) sandy loam; many medium and coarse light brownish gray (10YR 6/2) and yellowish brown (10YR 5/8) mottles; weak medium platy structure; firm, brittle; common distinct clay films on horizontal ped faces; few fine roots; common fine mica flakes; lower 2 inches consists of a gravel line of 25 percent angular and subrounded quartz gravel; very strongly acid; abrupt smooth boundary.

2C1—32 to 52 inches; multicolored brown, gray, and yellow loam; massive; friable; many fine mica flakes; many common medium and thin clay flows in crevices; very strongly acid; gradual smooth boundary.

2C2—52 to 72 inches; multicolored brown, yellow, red, white, and gray loam; massive; very friable; strongly weathered mica schist; very strongly acid.

The solum thickness ranges from 30 to 40 inches. The depth to bedrock is more than 60 inches. The depth to the fragipan is 15 to 30 inches. The content of rock fragments of angular quartz gravel is 0 to 15 percent in the solum except in the rock line. Rock fragments of gravel and cobbles make up as much as 50 percent of the rock line, and about 0 to 15 percent highly weathered schist fragments are in the lower part of the B horizon and in the C horizon. Few to many mica flakes are in the A horizon and upper part of the B horizon. The lower part of the B horizon and the C horizon are highly micaceous. The soil is very strongly acid or strongly acid unless limed.

The A horizon has hue of 10YR or 2.5Y, value of 3 through 5, and chroma of 2 through 4. It is silt loam, loam, or fine sandy loam.

The E horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 through 6. It is silt loam or loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 4 through 8. Low-chroma mottling is common in the B horizon above the fragipan. The Bt horizon is loam, silty clay loam, or clay loam.

The Bx horizon has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 4 through 6 and is

commonly mottled in shades of yellow, brown, or gray. It is loam or sandy loam.

Some pedons have a 2Bt horizon that is mottled in shades of brown, yellow, gray, or white. It is loam, sandy clay loam, or clay loam.

The 2C horizon is multicolored in shades of red, yellow, brown, gray, and white. It is loam or sandy loam from highly micaceous schist.

Hatboro Series

The soils of the Hatboro series are very deep and poorly drained. They formed in alluvium washed from soils developed from material weathered dominantly from acid crystalline rock of the northern part of the Piedmont Plateau. The soils are on low flood plains adjacent to the larger streams, such as the Occoquan River, Powells Creek, and Neabsco Creek. Slopes range from 0 to 2 percent.

The Hatboro soils commonly are near the Codorus and Comus soils on flood plains and the Elsinboro soils on stream terraces. The Hatboro soils are more poorly drained than those soils.

Typical pedon of Hatboro silt loam, 0 to 2 percent slopes, approximately 2,400 feet west of Route 643 and 45 feet south of Powells Creek:

A—0 to 7 inches; dark brown (10YR 4/3) silt loam; many fine distinct grayish brown (10YR 5/2), red (2.5YR 5/8), and yellowish red (5YR 5/6) mottles; moderate medium and fine granular structure; friable; many fine, medium, and coarse roots; common fine mica flakes; very strongly acid; clear smooth boundary.

Bg1—7 to 14 inches; grayish brown (10YR 5/2) silt loam; many fine distinct and faint reddish brown (5YR 4/4), brown (10YR 5/3), and very dark grayish brown (10YR 3/2) mottles; weak medium and fine subangular blocky structure; friable; many fine and medium roots; common fine mica flakes; very strongly acid; clear smooth boundary.

Bg2—14 to 24 inches; light brownish gray (10YR 6/2) silty clay loam; many medium distinct yellowish red (5YR 4/6), pale brown (10YR 6/3), and gray to light gray (2.5Y 6/0) mottles; weak medium and coarse subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; common fine mica flakes; very strongly acid; clear smooth boundary.

2Bg3—24 to 48 inches; gray (10YR 5/1) sandy clay loam; common fine prominent yellowish red (5YR 4/6) and strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; common fine mica flakes; very strongly acid; clear smooth boundary.

2Cg—48 to 60 inches; gray (10YR 5/1) stratified sandy sediments with 10 percent gravel throughout; common yellowish red (5YR 4/6) and strong brown (7.5YR 5/4) mottles; massive; friable; common fine mica flakes; moderately acid.

The solum thickness ranges from 40 to 60 inches. The depth to bedrock is mainly 5 to 10 feet. The content of rock fragments in the C horizon is 0 to 10 percent. Common to many mica flakes are in the solum and C horizon. The soil is very strongly acid through neutral in the surface layer and subsoil and moderately acid or slightly acid in the substratum.

The A horizon mainly has hue of 10YR, value of 3 or 4, and chroma of 2 or 3 but has mottles with higher value and higher chroma. It is dominantly silt loam but ranges to loam or sandy loam.

The B horizon has hue of 10YR through 5Y, value of 3 through 6, and chroma of 1 through 3 and has distinct brownish and reddish mottling. It is silt loam, silty clay loam, or sandy clay loam.

The unconforming C horizon is stratified sandy, silty, clayey, and gravelly sediments.

Haymarket Series

The soils of the Haymarket series are very deep and well drained and moderately well drained. They formed in residuum weathered from diabase in the Culpeper Basin of the northern part of the Piedmont Plateau. Slopes range from 2 to 15 percent.

The Haymarket soils commonly are near the Jackland, Montalto, Oakhill, and Waxpool soils. The Haymarket soils are better drained than and do not have the gray colors in the B horizon typical of the Jackland and Waxpool soils. The Haymarket soils have a thicker solum and more clay than the Oakhill soils and are more plastic and have a browner subsoil than the Montalto soils.

Typical pedon of Haymarket silt loam, 2 to 7 percent slopes, in Conway-Robinson Memorial Park about 1 mile west of Pageland Lane, about 1,700 feet northwest of Route 29-211, and about 150 feet south of the abandoned railroad bed:

Oi—1 inch to 0; partially decomposed hardwood leaves and twigs.

A—0 to 1 inch; dark brown (10YR 4/4) silt loam; moderate fine granular structure; very friable; many

fine, medium, and coarse roots; 1 percent gravel and cobbles of partially weathered diabase; very strongly acid; clear smooth boundary.

E—1 to 9 inches; light yellowish brown (10YR 6/4) silt loam; moderate fine granular structure; very friable; many fine and medium roots; common fine continuous pores; few fine iron-manganese concretions; 1 percent subrounded diabase gravel and cobbles; very strongly acid; clear smooth boundary.

BEt—9 to 13 inches; strong brown (7.5YR 5/6) silt loam; moderate fine subangular blocky structure; firm, plastic, sticky; common fine and medium roots; many distinct clay films on ped faces; common fine dark brown iron-manganese concretions; 1 percent diabase gravel and cobbles; very strongly acid; clear smooth boundary.

Bt1—13 to 27 inches; strong brown (7.5YR 5/6) clay; strong fine and medium subangular blocky structure; firm, very plastic, very sticky; common fine and medium roots; many prominent clay films on ped faces; many fine and medium iron-manganese concretions and streaks; 1 percent diabase gravel and cobbles; very strongly acid; clear smooth boundary.

Bt2—27 to 38 inches; yellowish red (5YR 5/6) clay; strong medium and coarse subangular blocky structure; very firm, very plastic, very sticky; common fine and medium roots; many prominent clay films on ped faces; few slickensides and pressure faces; few iron-manganese concretions; 1 percent diabase gravel and cobbles; very strongly acid; clear smooth boundary.

BCt—38 to 46 inches; strong brown (7.5YR 5/6) silty clay loam; many fine and medium brownish yellow (10YR 6/6), white (10YR 8/1), and black (10YR 2/1) parent-material mottling; moderate coarse subangular blocky structure; firm, plastic, very sticky; few fine roots; common prominent clay films on ped faces; common iron-manganese concretions and streaks; 1 percent diabase gravel and cobbles; strongly acid; gradual smooth boundary.

C—46 to 72 inches; multicolored saprolite in shades of yellow, brown, white, and black that crushes to loam; massive; friable, plastic, sticky; few fine roots; common distinct and prominent clay flows in upper 6 inches; 1 percent diabase gravel and cobbles; moderately acid.

The solum thickness ranges from 24 to 48 inches. The depth to bedrock is more than 60 inches. Rock fragments of diabase make up 0 to 15 percent of the A and B horizons and up to 25 percent of the C horizon. Few to many iron-manganese concretions and streaks are in the B horizon. The soil is very strongly acid through moderately acid in the A and B horizons and moderately acid through neutral in the C horizon.

The A horizon mainly has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 3 through 8. Lower chroma and value are common in the A or Ap horizon. The A horizon is silt loam, loam, silty clay loam, or clay loam.

The E horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 through 6. It is silt loam or loam.

The Bt horizon has hue of 5YR through 10YR, value of 4 or 5, and chroma of 4 through 6. It is clay. The BEt and BCt horizons are silt loam through clay.

The C horizon is commonly multicolored in shades of brown, yellow, green, black, and white. It is commonly loam, sandy loam, or clay loam in the fine earth fraction.

Hoadly Series

The soils of the Hoadly series are very deep and moderately well drained and somewhat poorly drained. They formed partly in colluvium from adjacent higher soils and partly in residuum from granite and granite gneiss of the northern part of the Piedmont Plateau. Slopes range from 2 to 7 percent.

The Hoadly soils commonly are near the Buckhall, Fairfax, and Occoquan soils. None of those nearby soils has a fragipan, gray mottles, or a seasonal high water table.

Typical pedon of Hoadly loam, 2 to 7 percent slopes, about 1 mile south of Independent Hill, about 1,350 feet east of Route 619:

Oi—1 inch to 0; partially decomposed hardwood leaves, pine needles, and twigs.

A—0 to 2 inches; very dark grayish brown (10YR 3/2) loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; 1 percent angular quartz gravel; very strongly acid; clear smooth boundary.

E—2 to 11 inches; light yellowish brown (2.5Y 6/4) loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; 1 percent angular quartz gravel; very strongly acid; clear smooth boundary.

BEt—11 to 15 inches; brownish yellow (10YR 6/6) loam; weak fine and medium subangular blocky structure; friable, slightly plastic; many fine and medium roots; few distinct clay films on ped faces; 1 percent

angular quartz gravel; few fine mica flakes; very strongly acid; clear smooth boundary.

Bt—15 to 29 inches; brownish yellow (10YR 6/8) clay loam; common medium and coarse light brownish gray (10YR 6/2) and light gray (10YR 7/1) mottles and few fine strong brown (7.5YR 5/8) mottles; moderate fine and medium subangular blocky structure; friable, slightly plastic; common fine and medium roots; common distinct clay films on ped faces; few fine mica flakes; very strongly acid; clear smooth boundary.

2Bx—29 to 41 inches; mottled brownish yellow (10YR 6/8), light gray (10YR 7/1), and reddish yellow (7.5YR 6/6) sandy clay loam; coarse polygonal structure parting to moderate medium platy; firm, brittle; polygonal cracks filled with light gray clay; 5 percent angular and subrounded quartz gravel; few very fine mica flakes; strongly acid; gradual smooth boundary.

2B't—41 to 53 inches; light gray to gray (10YR 6/1) sandy clay; common fine brownish yellow (10YR 6/6) mottles; moderate medium and coarse prismatic structure; very firm, plastic, slightly sticky; many sandy coatings and distinct clay films on ped faces; very strongly acid; gradual smooth boundary.

2C—53 to 72 inches; light gray to gray (10YR 6/1) sandy loam; common fine mottles in shades of brown and yellow; massive; very friable; saprolite from granite gneiss; many fine mica flakes; very strongly acid.

The solum thickness ranges from about 40 to 60 inches. The depth to bedrock is more than 60 inches. The content of rock fragments of angular and subrounded quartz gravel mainly is 1 to 15 percent; higher concentrations are commonly at the lithologic discontinuity. The content of mica flakes ranges from few in the upper part of the B horizon to many in the 2B and 2C horizons. The soil is very strongly acid through slightly acid.

The A horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 0 through 2. The A horizon is loam, sandy loam, or fine sandy loam.

The E horizon has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 2 through 4. It is loam, sandy loam, or fine sandy loam.

The upper part of the B horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 through 6, and chroma mainly of 4 through 8. Mottling with chroma of 2 or less is in the upper 10 inches. The upper part of the B horizon is sandy loam, loam, sandy clay loam, or clay loam.

The Bx horizon is commonly mottled in shades of brown, yellow, and gray and is sandy loam, loam, or sandy clay loam. It ranges from 6 to 30 inches thick and is firm, platy, and brittle. Rock lines from 2 to 6 inches thick make up 2 to 30 percent of angular and subrounded quartz gravel.

The 2B horizon is commonly mottled in shades of yellow, brown, and gray and is sandy clay, sandy clay loam, loam, clay loam, or clay. Some pedons do not have a 2B horizon.

The 2C horizon is mottled in shades of yellow, brown, and gray and is loam, sandy loam, or sandy clay loam. It is saprolite from weathered granite or granite gneiss.

Jackland Series

The soils of the Jackland series are very deep and moderately well drained and somewhat poorly drained. They formed on uplands in residuum from diabase and basalt in the northern part of the Piedmont Plateau. Slopes range from 2 to 15 percent.

The Jackland soils commonly are near the Montalto and Waxpool soils. The Jackland soils have gray mottles at a depth of 12 to 24 inches and a seasonal high water table, neither of which is typical of the Montalto soils, and the Jackland soils are more plastic and have less red in the subsoil than the Montalto soils. The Jackland soils have a browner surface layer than the Waxpool soils and do not have the abrupt textural change typical of the Waxpool soils.

Typical pedon of Jackland silt loam, 2 to 7 percent slopes, in Conway Robinson Memorial State Park, about 1.5 miles east of Gainesville, about 800 feet north of Route 29-211, about 300 feet west of the picnic shelter:

Ap—0 to 10 inches; yellowish brown (10YR 5/6) silt loam; moderate medium granular structure; friable, slightly plastic, slightly sticky; many fine, medium, and coarse roots; 2 percent gravel and cobbles of diabase fragments; very strongly acid; clear smooth boundary.

BEt—10 to 15 inches; dark yellowish brown (10YR 4/4) silt loam; few fine, medium, and coarse pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; firm, sticky, plastic; common fine and medium roots; many fine iron-manganese concretions; 2 percent diabase gravel and cobbles; many distinct clay films on ped faces; very strongly acid; clear smooth boundary.

Bt1—15 to 30 inches; dark yellowish brown (10YR 4/4) clay; common fine and medium gray (10YR 6/1)

mottles; moderate coarse subangular blocky structure; very firm, very plastic, very sticky; few fine roots; common fine and medium iron-manganese concretions; 1 percent diabase gravel and cobbles; common prominent clay films on ped faces; many pressure faces and slickensides; very strongly acid; clear smooth boundary.

Bt2—30 to 35 inches; yellowish brown (10YR 5/6) clay; moderate coarse subangular blocky structure; very firm, very plastic, very sticky; few fine roots; common fine and medium iron-manganese concretions; 1 percent diabase gravel and cobbles; common prominent clay films on ped faces; many pressure faces and slickensides; very strongly acid; clear wavy boundary.

BCt—35 to 40; yellowish brown (10YR 5/6) clay loam; weak medium subangular blocky structure; firm, plastic, sticky; few fine roots; common fine and medium iron-manganese concretions; 1 percent diabase gravel and cobbles; few distinct and prominent clay films on ped faces; very strongly acid; gradual wavy boundary.

C—40 to 65 inches; multicolored brown, yellow, green, white, and black sandy loam; massive; friable, slightly plastic, sticky; common iron-manganese streaks; thick very plastic clay flows in crevices in the upper 15 inches; 3 percent diabase gravel and cobbles; slightly acid.

The solum thickness ranges from 24 to 48 inches. The depth to bedrock is greater than 60 inches. Partially weathered diabase gravel makes up 0 to 15 percent of the A and B horizons and up to 30 percent of the C horizon. A few cobbles and boulders are in some pedons. The soil ranges from very strongly acid through moderately acid in the A horizon and upper part of the B horizon and ranges from very strongly acid through mildly alkaline in the lower part of the B horizon and in the C horizon.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 through 6. Some pedons have a thin A horizon that has value of 2 or 3 and chroma of 0 or 2. The A horizon is silt loam or loam.

Some pedons have an E horizon that has hue of 10YR or 7.5YR, value of 4 through 6, and chroma of 3 through 6. It is silt loam or loam.

The Bt horizon has hue mainly of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 through 6. Some pedons have hue of 2.5Y in the lower part of the B horizon. The Bt horizon is clay. The BCt horizon is clay loam or sandy clay loam.

The C horizon is commonly multicolored in shades of brown, yellow, white, green, and black. It is clay loam, sandy clay loam, or sandy loam and their gravelly or cobbly analogues.

Kelly Series

The soils of the Kelly series are deep and somewhat poorly drained. They formed in residuum weathered from gray to brown hornfels and granulite rocks. The soils are on upland flats in the Culpeper Basin of the northern part of the Piedmont Plateau. Slopes range from 0 to 15 percent.

The Kelly soils commonly are near the Catlett, Jackland, Sycoline, and Waxpool soils. The Kelly soils have more clay than the Catlett or Sycoline soils and have less montmorillonitic clay than the Jackland or Waxpool soils.

Typical pedon of Kelly silt loam, 0 to 2 percent slopes, about ¼ mile southeast of Gainesville, about 75 feet north of Route 674:

Oi—2 inches to 0; partially decomposed leaves, pine needles, and twigs.

A—0 to 1 inch; very dark grayish brown (10YR 3/2) silt loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; 2 percent angular hornfels gravel; strongly acid; abrupt smooth boundary.

E—1 to 9 inches; brown (10YR 5/3) silt loam; moderate fine and medium granular structure; friable; many fine and medium roots, few coarse roots; many fine and medium pores; 3 percent angular hornfels and granulite gravel; strongly acid; clear smooth boundary.

Bt1—9 to 19 inches; light olive brown (2.5Y 5/4) silty clay loam; common fine and medium distinct light gray to gray (10YR 6/1) mottles and few fine and medium distinct reddish yellow (7.5YR 6/8) mottles; 3 percent angular hornfels and granulite gravel; common fine and medium pores; common medium roots; many distinct clay films on ped faces; moderately acid; gradual smooth boundary.

2Bt2—19 to 31 inches; mottled very dark grayish brown (2.5Y 3/2) and dark gray (2.5Y N 4/0) clay; few reddish yellow (7.5YR 6/8) parent-material streaks and mottles; medium acid; moderate fine and medium subangular blocky structure; firm, very plastic, very sticky; common fine and medium roots; few and common prominent clay films on ped faces; 3 percent dark gray (2.5Y N 4/0) to black (2.5Y N 2/0) angular hornfels gravel; moderately acid; clear smooth boundary.

2Bt3—31 to 38 inches; very dark gray (10YR 3/1) clay; weak medium and fine subangular blocky structure; firm, plastic, sticky; few fine roots; 15 percent angular dark gray (10YR 4/1) hornfels gravel; many distinct and prominent clay films on ped faces; moderately acid; clear smooth boundary.

2BCt—38 to 41 inches; mottled dark brown (10YR 3/3), dark gray (10YR 4/1), black (10YR 2/1), and light brownish gray (10YR 6/2) gravelly silty clay; massive; friable, slightly plastic, sticky; 20 percent angular hornfels gravel; few fine roots; moderately acid; abrupt wavy boundary.

2Cr—41 to 45 inches; very dark grayish brown (10YR 3/2) partially weathered hornfels.

2R—45 inches; very dark grayish brown (10YR 3/2) hard hornfels.

The solum thickness ranges from 24 to 48 inches. The depth to bedrock ranges from 40 to 60 inches. The content of hornfels and granulite gravel ranges from 0 to 15 percent in the solum and 5 to 35 percent in the C horizon. The content of hornfels and granulite cobblestones is 0 to 5 percent in the C horizon. The low-chroma mottles are due to wetness and inherited colors of the parent material. The upper part of the solum ranges from very strongly acid through moderately acid, and the lower part of the solum and the C horizon are slightly acid or neutral.

The A horizon is neutral or has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 0 through 2. Some pedons have an Ap horizon that has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 through 4. The A horizon is silt loam or loam

The E horizon has hue of 10YR or 2.5Y, value 4 through 6, and chroma of 2 or 3. It is silt loam.

The Bt horizon has hue of 10YR, 2.5YR, or 5Y, value of 3 through 5, and chroma of 1 through 4. It is clay, clay loam, silty clay, or silty clay loam.

The 2Bt horizon has hue of 10YR or 2.5Y, value of 3 through 5, and chroma of 0 through 4. The 2Bt horizon is clay or silty clay.

The C horizon is mottled in shades of yellow, gray, and brown. It is sandy clay loam, silt loam, silty clay, or clay and their shaly or gravelly analogues.

Legore Series

The soils of the Legore series are very deep and well drained. They formed in residuum from diabase and basalt in the Triassic part of the northern Piedmont Plateau. Slopes range from 2 to about 25 percent.

The Legore soils commonly are near the Haymarket, Jackland, Oakhill, and Waxpool soils. The Legore soils have less clay than the Haymarket, Jackland, or Waxpool soils; are deeper to bedrock than the Oakhill soils; and are on higher landscape positions and are better drained than the Waxpool soils.

Typical pedon of Legore loam, in an area of Legore-Oakhill complex, 2 to 7 percent slopes, about 60 feet northeast of Route 681, about 1 mile north of Interstate Highway 66, about 1,200 feet east of the entrance to Silver Lake Campground:

Ap—0 to 6 inches; brown (7.5YR 4/4) loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; 10 percent quartz and diabase gravel; strongly acid; clear smooth boundary.

Bt1—6 to 15 inches; strong brown (7.5YR 5/6) loam; moderate fine and medium subangular blocky structure; firm, slightly plastic, slightly sticky; common fine and medium roots; common distinct clay films on ped faces; 10 percent quartz and diabase gravel; strongly acid; clear smooth boundary.

Bt2—15 to 28 inches; yellowish red (5YR 4/6) sandy clay loam; moderate fine and medium subangular blocky structure; firm, slightly plastic, sticky; common distinct clay films on ped faces; 15 percent quartz and partially weathered diabase gravel; moderately acid; gradual smooth boundary.

C1—28 to 45 inches; multicolored red, yellow, and brown sandy loam; massive; friable; common thin and medium clay films in crevices; few fine roots; common fine iron-manganese concretions and streaks; 15 percent partially weathered diabase gravel; moderately acid; clear smooth boundary.

C2—45 to 72 inches; multicolored brown, yellow, black, and green sandy loam; massive; very friable; few fine roots; 15 percent partially weathered diabase gravel; moderately acid.

The solum thickness ranges from 20 to 34 inches. The depth to bedrock is more than 60 inches. Subrounded diabase or basalt gravel and cobbles make up 3 to 15 percent of the A and B horizons and up to 30 percent of the C horizon. The soil is strongly acid through moderately acid in the A horizon and upper part of the B horizon, and is moderately acid or slightly acid in the lower part of the B horizon and in the C horizon.

The A horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 through 4. It is loam or silt loam.

Some pedons have an E horizon that has hue of 7.5YR or 10YR, value of 4 or 6, and chroma of 3

through 6. It is loam or silt loam.

The B horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 or 5, and chroma of 3 through 6. It is loam, silty clay loam, clay loam, or sandy clay loam.

The C horizon is multicolored in shades of black, brown, yellow, green, and white. It is loam, sandy loam, or silty clay loam in the fine earth fraction.

Lunt Series

The soils of the Lunt series are very deep and well drained. They formed in stratified sediments of sand, silt, and clay. They are on ridges, side slopes, and toe slopes of the northern part of the Coastal Plain terraces. Slopes range from 2 to 25 percent.

The Lunt soils commonly are near the Dumfries, Neabsco, and Quantico soils. The Lunt soils have more clay than the Dumfries soils, do not have the fragipan typical of the Neabsco soils, and have a higher base saturation and more montmorillonitic clay than the Quantico soils.

Typical pedon of Lunt loam, 2 to 7 percent slopes, about 1,340 feet west of the junction of Blackburn Road and Maryland Drive, about 540 feet east of Route 1:

Oi—1 inch to 0; partially decomposed hardwood leaves, pine needles, and twigs.

Ap1—0 to 1 inch; very dark grayish brown (10YR 3/2) loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; 1 percent quartz gravel; very strongly acid; clear smooth boundary.

Ap2—1 to 7 inches; brown to dark brown (7.5YR 4/4) loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; 1 percent quartz gravel; very strongly acid; abrupt smooth boundary.

Bt1—7 to 19 inches; strong brown (7.5YR 5/6) clay; strong medium and fine subangular blocky structure; very firm, very plastic, very sticky; many fine and medium roots, few coarse roots; common prominent clay films on ped faces; 1 percent quartz gravel; few fine mica flakes; very strongly acid; clear smooth boundary.

Bt2—19 to 34 inches; strong brown (7.5YR 5/6) clay loam; strong medium and coarse subangular blocky structure; firm, plastic, very sticky; common fine and medium roots; medium and common prominent clay films on ped faces; common fine roots; 1 percent quartz gravel; few fine mica flakes; very strongly acid; clear smooth boundary.

BCt—34 to 39 inches; strong brown (7.5YR 5/6) clay loam; common fine and medium brownish yellow (10YR 6/8) and pale brown (10YR 6/3) mottles; moderate medium and fine subangular blocky structure; friable, slightly plastic, very sticky; common fine roots; 1 percent quartz gravel; few fine mica flakes; many distinct clay films on ped faces; very strongly acid; clear smooth boundary.

C1—39 to 47 inches; yellowish brown (10YR 5/8) sandy loam; many medium and fine mottles in shades of yellow, brown, red, white, and green; massive, friable, sticky; common thin and medium clay flows; few fine roots; 1 percent quartz gravel; few fine mica flakes; very strongly acid; gradual smooth boundary.

C2—47 to 72 inches; very pale brown (10YR 7/3) sandy loam; many fine brownish yellow (10YR 6/6), strong brown (7.5YR 5/6), and black (10YR 2/1) mottles; massive; very friable; 1 percent quartz gravel; feldspathic sands; few fine mica flakes; very strongly acid.

The solum thickness ranges from 24 to 48 inches. Coarse fragments of quartz gravel make up 1 to 20 percent of the A horizon, 1 to 10 percent of the B and C horizons, and up to 50 percent of thin strata of the C horizon. The soil is very strongly acid or strongly acid unless limed. A few mica flakes are in the B and C horizons.

The A or Ap horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 3 through 6, and chroma of 2 through 4. It is fine sandy loam, sandy loam, loam, or silt loam in the fine earth fraction. In pedons with an eroded surface it is sandy clay loam.

Some pedons have an E horizon that has hue of 7.5YR, 10YR, or 2.5Y, value of 5 or 6, and chroma of 3 through 6. It is sandy loam, loam, or silt loam in the fine earth fraction.

The B horizon has hue of 5YR, 7.5YR, or 10YR, value of 3 or 5, and chroma of 3 through 8. Low-chroma mottles are common in the upper 10 inches of the argillic horizon. The B horizon is clay, sandy clay, or clay loam.

Manassas Series

The soils of the Manassas series are very deep and well drained and moderately well drained. They formed partly in local colluvium and partly in residuum weathered from Triassic red beds. The soils are in depressions on toe slopes, along drainageways, and in saddles in the northern part of the Piedmont Plateau. Slopes range from 2 to 7 percent.

The Manassas soils commonly are near the Arcola, Dulles, Reaville, and Sudley soils. The Manassas soils are better drained and have less clay than the Dulles soils, are in lower positions and are not so well drained as the Arcola or Sudley soils, and have a thicker solum than the Reaville soils.

Typical pedon of Manassas silt loam, 2 to 7 percent slopes, about 600 feet west of Route 234 and about 350 feet north of the picnic grounds in Manassas Battlefield Park:

Ap—0 to 10 inches; brown to dark brown (7.5YR 4/4) silt loam; moderate fine and medium granular structure; friable; many fine roots; few fine iron-manganese concretions; strongly acid; abrupt smooth boundary.

Bt1—10 to 21 inches; strong brown (7.5YR 5/6) silt loam; weak fine and medium subangular blocky structure; friable, slightly plastic, slightly sticky; common fine roots; common distinct clay films on ped faces; common fine vesicular pores; common fine and medium iron-manganese concretions; strongly acid; clear smooth boundary.

Bt2—21 to 33 inches; reddish brown (5YR 5/4) clay loam; moderate fine and medium subangular blocky structure; firm, slightly plastic, slightly sticky; common fine roots; common distinct clay films on ped faces; common fine vesicular pores; many fine and medium iron-manganese concretions; strongly acid; clear smooth boundary.

2Bt3—33 to 43 inches; dark reddish brown (2.5YR 3/4) silty clay loam; common coarse distinct gray (5YR 6/2) and light gray (5YR 7/1) mottles and coatings on ped faces; moderate medium subangular blocky structure; firm, sticky, slightly plastic; few fine roots; common distinct clay films and silt coatings on ped faces; common fine and medium vesicular pores; 10 percent weathered siltstone fragments up to 1 inch in diameter; strongly acid; clear smooth boundary.

2C—43 to 49 inches; dark reddish brown (2.5YR 3/4) channery sandy loam; many medium and coarse distinct pinkish gray (5YR 6/2) mottles and coatings; massive; common fine vesicular pores; 30 percent siltstone fragments up to 3 inches in diameter; common fine and medium iron-manganese concretions; strongly acid; clear smooth boundary.

2Cr—49 to 60 inches; partially weathered red (2.5YR 5/6) siltstone; pinkish gray (5YR 6/2) coatings in crevices and on faces of siltstone in the upper 2 to 4 inches.

The solum thickness ranges from 30 to 60 inches. The depth to soft bedrock is from 40 to 60 inches. Red shale rock fragments make up 0 to 15 percent of the A and B horizons and 15 to 50 percent of the C horizon. The soil is very strongly or strongly acid unless limed.

The A horizon has hue of 5YR or 7.5YR, value of 3 through 6, and chroma of 3 or 4. It is silt loam or loam. Some pedons have an E horizon that has hue of 5YR or 7.5YR, value of 4 through 6, and chroma of 4 through 6. It is silt loam or loam.

The Bt horizon has hue of 2.5YR or 5YR, value of 3 through 5, and chroma mainly of 3 through 6. Low-chroma mottling is in some pedons. The Bt horizon is silt loam, silty clay loam, or clay loam.

The C horizon has hue of 2.5YR or 5YR, value of 3 through 5, and chroma of 3 or 4. It is silt loam through sandy loam in the fine earth fraction.

Marr Series

The soils of the Marr series are very deep and well drained. They formed in unconsolidated deposits of fine and very fine sandy loam in the northern part of the Coastal Plain terraces. Slopes range from about 7 to 50 percent.

The Marr soils commonly are near the Lunt, Neabsco, and Quantico soils. The Marr soils have less clay and more fine and very fine sand than the Lunt and Neabsco soils and are better drained than and do not have the fragipan typical of the Neabsco soils.

Typical pedon of Marr very fine sandy loam, 7 to 25 percent slopes, about 75 feet south of Route 635 and about 4,000 feet east of Route 1:

Oi—1 inch to 0; partially decomposed hardwood leaves, pine needles, and twigs.

A—0 to 2 inches; dark grayish brown (10YR 4/2) very fine sandy loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; strongly acid; clear smooth boundary.

E—2 to 13 inches; light yellowish brown (10YR 6/4) very fine sandy loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; 1 percent fine rounded quartz gravel up to ½ inch thick; strongly acid; clear smooth boundary.

Bt1—13 to 18 inches; yellowish brown (10YR 6/4) sandy clay loam; weak fine subangular blocky structure; friable, slightly sticky; many fine and medium roots; few faint clay films on ped faces; 1 percent fine rounded quartz gravel up to ½ inch thick; few fine mica flakes; strongly acid; clear smooth boundary.

Bt2—18 to 33 inches; yellowish red (5YR 5/8) sandy

clay loam; moderate fine and medium subangular blocky structure; friable, slightly plastic, sticky; many fine and medium roots; 1 percent fine rounded quartz gravel up to ½ inch thick; common distinct clay films on ped faces; few fine mica flakes; very strongly acid; clear smooth boundary.

Bt3—33 to 40 inches; yellowish red (5YR 5/8) sandy clay loam; common medium and coarse distinct olive yellow (2.5Y 6/8) mottles; moderate fine and medium subangular blocky structure; friable, slightly plastic, sticky, common fine roots; common and many prominent clay films on ped faces; few mica flakes; very strongly acid; gradual smooth boundary.

BCt—40 to 53 inches; strong brown (7.5YR 5/8) sandy clay loam; common medium and coarse distinct yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; friable, slightly plastic, sticky; few fine roots; common prominent clay films on ped faces; common fine mica flakes; very strongly acid; gradual smooth boundary.

C—53 to 72 inches; strong brown (7.5YR 5/8) sandy loam; many fine and medium distinct yellowish brown (10YR 5/8) and yellowish red (5YR 5/8) mottles; massive; very friable, slightly sticky; few thin clay flows in upper 10 inches; common fine mica flakes; very strongly acid.

The solum thickness ranges from about 30 to 60 inches. The depth to bedrock is greater than 5 feet. The content of fine rounded quartz gravel is 0 to 5 percent. Few to common mica flakes are in the B and C horizons. The soil is strongly acid in the surface layer and very strongly acid or strongly acid in the subsoil and substratum.

The A horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 through 6, and chroma of 2 through 5. It is fine sandy loam or very fine sandy loam.

The E horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 5 through 7, and chroma of 3 through 6. It is fine sandy loam or very fine sandy loam.

The B horizon has hue of 5YR, 7.5YR, or 10YR, value of 5 or 6, and chroma of 6 or 8. The B horizon is sandy clay loam.

The C horizon has hue of 7.5YR, 10YR, or 2.5Y and value and chroma of 5 through 8. The upper part of the C horizon is fine sandy loam, very fine sandy loam, or sandy loam. The lower part in some pedons is coarser textured and in places has a high content of feldspathic sands.

Marumsco Series

The soils of the Marumsco series are very deep and moderately well drained and somewhat poorly drained. They formed in stratified marine sediments of the low Coastal Plain terraces. The soils are in depressional areas. Slopes range from 0 to 4 percent.

The Marumsco soils commonly are near the Lunt and Dumfries soils. The Lunt soils have a base saturation of more than 35 percent, and the Dumfries soils have more clay in the subsoil than the Marumsco soils.

Typical pedon of Marumsco loam, 0 to 4 percent slopes, about 100 feet south of Route 633 and about 2 miles east of Route 1, at Dumfries:

Oi—2 inches to 0; partially decomposed hardwood leaves and twigs.

A—0 to 1 inch; very dark grayish brown (10YR 3/2) loam; moderate fine granular structure; very friable, nonsticky, nonplastic; many fine, medium, and coarse roots; few fine mica flakes; 1 percent rounded quartz gravel; extremely acid; clear smooth boundary.

E—1 to 7 inches; pale brown (10YR 6/3) loam; moderate fine granular structure; very friable, slightly sticky, slightly plastic; many fine, medium, and coarse roots; few fine mica flakes; 1 percent rounded quartz gravel; extremely acid; clear smooth boundary.

Bt1—7 to 10 inches; brownish yellow (10YR 6/6) clay loam; moderate fine subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and medium roots; 1 percent rounded quartz gravel; few fine mica flakes; common distinct clay films; extremely acid; clear smooth boundary.

Bt2—10 to 29 inches; brownish yellow (10YR 6/6) clay; common medium distinct light brownish gray (10YR 6/2) and gray (10YR 5/1) mottles; moderate fine and medium subangular blocky structure; firm, plastic, sticky; common fine and medium roots; many distinct and prominent clay films; few fine mica flakes; 1 percent rounded quartz gravel; extremely acid; gradual smooth boundary.

Btg—29 to 47 inches; gray (10YR 5/1) sandy clay loam; many medium and coarse distinct brownish yellow (10YR 6/6) and prominent reddish yellow (7.5YR 7/8) mottles; moderate coarse prismatic structure; firm in place, slightly sticky, slightly plastic; many distinct and prominent clay films and coatings on ped faces; few fine mica flakes; 1 percent rounded quartz gravel; very strongly acid; clear smooth boundary.

Cg—47 to 75 inches; light gray (10YR 6/1) sandy clay loam; common medium and coarse distinct brownish yellow (10YR 6/6) mottles; structureless; very friable to firm (consists of stratified sand to clay); few fine mica flakes; 3 percent rounded quartz gravel; very strongly acid.

The solum thickness ranges from 40 to 60 inches. The depth to bedrock is more than 5 feet. Rock fragments of rounded quartz gravel make up 1 to 5 percent of the solum and 1 to 15 percent of the C horizon. The soil is extremely acid or very strongly acid unless limed.

The A horizon is neutral or has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 0 through 2. The A horizon is sandy loam, fine sandy loam, or loam.

The E horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 2 through 4. The E horizon is sandy loam, fine sandy loam, or loam. The Bt and Btg horizons have hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 through 8 in the upper part and 1 through 3 in the lower part. They are clay loam, sandy clay loam, or clay.

The C horizon has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 1 or 2. The C horizon is stratified sediments that range from sand to clay.

Meadowville Series

The soils of the Meadowville series are very deep and well drained and moderately well drained. They formed partly in colluvial materials and partly in materials weathered from muscovite schist and gneiss. They are in depressional areas on toe slopes, along drainageways, and in saddle positions in the northern part of the Piedmont Plateau. These soils are flooded for very brief periods after heavy rains. Slopes range from 0 to 5 percent.

The Meadowville soils commonly are near the Baile, Buckhall, Elioak, and Glenville soils. They are better drained than the Baile and Glenville soils and are on lower positions and have less clay than the Buckhall and Elioak soils.

Typical pedon of Meadowville loam, 0 to 5 percent slopes, about 300 feet north of Hoadly Road and about 50 feet east of Valleyvue Drive:

Oi—2 inches to 0; partially decomposed hardwood leaves and twigs.

A—0 to 2 inches; dark brown (7.5YR 3/2) loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; common fine mica flakes; 1 percent angular quartz gravel; very strongly acid; clear smooth boundary.

E—2 to 9 inches; brown (7.5YR 5/4) loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; common fine mica flakes; 1 percent angular quartz gravel; very strongly acid; clear smooth boundary.

BEt—9 to 12 inches; strong brown (7.5YR 5/6) loam; weak fine subangular blocky structure; friable; many fine, medium, and coarse roots; common fine mica flakes; 1 percent angular quartz gravel; few distinct clay films on ped faces; very strongly acid; clear smooth boundary.

Bt1—12 to 31 inches; strong brown (7.5YR 5/8) clay loam; moderate fine subangular blocky structure; friable; common fine and medium roots; many fine mica flakes; many distinct clay films on ped faces; very strongly acid; abrupt smooth boundary.

Bt2—31 to 39 inches; strong brown (7.5YR 5/6) gravelly loam; common fine and medium distinct brownish yellow (10YR 6/6) and yellowish red (5YR 5/8) mottles; moderate fine subangular blocky structure; very friable; common fine roots; 30 percent angular and subrounded quartz gravel and cobbles; common distinct clay films on ped faces; many fine mica flakes; very strongly acid; abrupt smooth boundary.

3C1—39 to 45 inches; multicolored red, yellow, brown, white, and black sandy loam; massive; very friable; many fine mica flakes; common thin and medium clay flows; very strongly acid; clear smooth boundary.

3C2—45 to 72 inches; multicolored red, yellow, brown, white, and black sandy loam; massive; very friable; strongly weathered mica schist; very strongly acid.

The solum thickness ranges from 30 to 60 inches. The depth to bedrock is more than 60 inches. The depth to the rock line and unconforming materials ranges from 30 to 50 inches. Rock fragments make up 0 to 10 percent of the surface layer and upper part of the subsoil and up to 40 percent at the lithologic discontinuity. Few to many mica flakes are in the A horizon and upper part of the B horizon, and the substratum is highly micaceous. The soil is very strongly acid through moderately acid unless limed.

The A horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 through 5. It is sandy loam, loam, or silt loam.

The E horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 or 4. It is sandy loam, loam, or silt loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 4

or 5, and chroma of 6 through 8. It is loam, clay loam, or silty clay loam and their gravelly analogues. The 2B horizon includes sandy clay loam.

The C horizon is multicolored in shades of red, yellow, brown, and white. Low-chroma mottling is in some pedons. The C horizon is loam or sandy loam of strongly weathered muscovite mica schist or gneiss.

Minnieville Series

The soils of the Minnieville series are very deep and well drained. They formed in materials weathered from hornblende gneiss and other mixed basic and acid rocks. Minnieville soils are on uplands of the northern part of the Piedmont Plateau. Slopes range from about 2 to 15 percent.

The Minnieville soils commonly are near the Buckhall, Fairfax, Orenda, and Spriggs soils. The Minnieville soils have a more plastic subsoil and formed in more basic parent material than the Buckhall and Fairfax soils and are deeper and have a redder subsoil than the Orenda soils. The Fairfax soils have a cap of Coastal Plain sediments.

Typical pedon of Minnieville clay loam, 2 to 7 percent slopes, severely eroded, on a ridgecrest about 1,300 feet east of Purcell Road and about 350 feet north of Minnieville Road:

Ap—0 to 8 inches; brown to dark brown (7.5YR 4/4) clay loam; moderate fine granular structure; friable, slightly plastic; many fine roots; 1 percent angular quartz gravel; strongly acid; abrupt smooth boundary.

Bt1—8 to 29 inches; red (2.5YR 4/8) clay; strong fine subangular blocky structure; firm, plastic, sticky; many fine roots; common and many distinct clay films on ped faces; 2 percent angular quartz gravel; few fine mica flakes; strongly acid; gradual smooth boundary.

Bt2—29 to 48 inches; red (2.5YR 4/6) clay; many fine and medium strong brown (7.5YR 5/8) and brownish yellow (10YR 6/8) parent-material mottles; moderate fine and medium subangular blocky structure; firm, plastic, sticky; many prominent clay films on ped faces; common fine iron-manganese concretions and streaks; 2 percent angular quartz gravel; few fine mica flakes; strongly acid; gradual smooth boundary.

C1—48 to 58 inches; red (2.5YR 5/8) clay loam; many fine, medium, and coarse yellowish brown (10YR 5/6) and pale brown (10YR 6/3) parent-material mottles; massive; friable, slightly plastic, slightly sticky; 15 percent partially weathered hornblende gneiss fragments and 2 percent angular quartz gravel; few fine mica flakes; common fine iron-manganese concretions and streaks; strongly acid; gradual smooth boundary.

C2—58 to 80 inches; multicolored red, yellow, brown, olive, and white silty clay loam; massive; very friable; 20 percent highly weathered hornblende gneiss fragments; 2 percent angular quartz gravel; few fine mica flakes; strongly acid; strongly weathered hornblende gneiss saprolite.

The solum thickness ranges from 40 inches to mainly 60 inches. The depth to bedrock is more than 60 inches. Rock fragments of angular quartz gravel make up 0 to 10 percent of the A and B horizons. Weathered hornblende gneiss or similar rock fragments make up 5 to 30 percent of the lower part of the subsoil and the substratum. Few to common mica flakes are in the B and C horizons. The soil is strongly acid or moderately acid unless limed.

The A horizon has hue of 5YR, 7.5YR, or 10YR, value of 3 through 5, and chroma of 3 through 6. It is loam, silt loam, or clay loam.

The Bt horizon has hue mainly of 2.5YR or 10R, value of 3 or 4, and chroma of 4 through 8. Mottling with yellower and browner hues is common in the lower part of the B horizon. The Bt horizon is dominantly clay, clay loam, or silty clay in the fine earth fraction.

The C horizon is multicolored in shades of red, yellow, brown, olive, and white. It is strongly weathered gneiss saprolite. It is clay loam, silty clay loam, loam, or silt loam in the fine earth fraction.

Montalto Series

The soils of the Montalto series are very deep and well drained. They formed in materials weathered from basalt, diabase, and syenite rocks. Montalto soils are on uplands of the Triassic area of the northern part of the Piedmont Plateau. Slopes are about 2 to 15 percent.

The Montalto soils commonly are near the Jackland, Legore, Oakhill, and Waxpool soils. The Montalto soils are redder and do not have the very plastic subsoil typical of Jackland and Waxpool soils, have a thicker subsoil and more clay than Legore soils, and have a thicker, more clayey subsoil than Oakhill soils.

Typical pedon of Montalto silty clay loam, 2 to 7 percent slopes, on Falkland Farms about 1 mile northwest of Route 29-11 at Broad Run, about 100 feet southeast of the manor house and about 75 feet east of a private road:

Ap—0 to 7 inches; yellowish red (5YR 4/6) silty clay loam; moderate fine granular structure; friable, slightly plastic, slightly sticky; many fine roots; 5 percent partially weathered basalt gravel; strongly acid; abrupt smooth boundary.

Bt1—7 to 13 inches; red (2.5YR 4/6) clay; moderate fine and med um subangular blocky structure; firm, plastic, sticky; common fine roots; many distinct clay films on ped faces; 5 percent partially weathered basalt gravel; strongly acid; clear smooth boundary.

Bt2—13 to 35 inches; red (2.5YR 4/6) clay; moderate medium and fine subangular blocky structure; firm, plastic, sticky; few prominent clay films on ped faces; common fine roots; few partially weathered basalt fragments up to 10 inches thick; few fine and medium iron-manganese concretions and coatings; strongly acid; gradual smooth boundary.

Bt3—35 to 45 inches; red (2.5YR 4/6) cobbly clay; weak fine subangular blocky structure; friable, slightly plastic, sticky; few fine roots; common distinct clay films on ped faces; 25 percent partially weathered basalt fragments; common iron-manganese concretions and coatings; moderately acid; gradual smooth boundary.

C—45 to 62 inches; multicolored red, yellow, brown, and black cobbly loam; massive; very friable; slightly sticky; few thin and medium clay flows in crevices; 30 percent partially weathered basalt fragments up to 10 inches thick; many iron-manganese coatings and concretions; moderately acid; gradual irregular boundary.

Cr—62 inches; partially weathered basalt; few medium red (2.5YR 4/6) clay flows and iron-manganese coatings in crevices.

The solum thickness ranges from 40 to 60 inches. The depth to bedrock is mainly 5 to 10 feet. Partially weathered gravel and cobbles make up 0 to 15 percent of the surface layer and upper part of the subsoil and up to 30 percent of the lower part of the B horizon and the C horizon. A few stones and boulders are on the surface of some areas. The soil is very strongly acid through slightly acid unless limed. Content of quartz sand is commonly low throughout the solum.

The A horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 2 through 6. It is loam, silt loam, or silty clay loam.

Some pedons have an E horizon that has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 3 or 4. It is loam or silt loam.

The Bt horizon has hue of 10R through 5YR, value of 3 or 4, and chroma of 4 through 8. It is clay loam, silty clay loam, silty clay, or clay in the fine earth fraction.

The C horizon is multicolored in shades of red, yellow, brown, and black loam, silt loam, clay loam, or silty clay loam in the fine earth fraction.

Neabsco Series

The soils of Neabsco series are very deep and moderately well drained. They formed in unconsolidated fluviomarine sediments of the northern part of the Coastal Plain uplands. Slopes range from 0 to about 15 percent.

The Neabsco soils commonly are near the Dumfries, Fairfax, Lunt, and Quantico soils. None of those nearby soils has a fragipan.

Typical pedon of Neabsco loam, 0 to 7 percent slopes, in Prince William Forest Park, about 100 feet southwest of Park Central Road and about 20 feet south of Trail #11:

Oi—1 inch to 0; partially decomposed oak leaves, pine needles, and twigs.

A—0 to 2 inches; dark brown (10YR 4/3) loam; moderate fine and very fine granular structure; very friable; many fine, medium, and coarse roots; 3 percent rounded quartz gravel; very strongly acid; clear smooth boundary.

E—2 to 8 inches; light yellowish brown (10YR 6/4) loam; moderate fine and very fine granular structure; very friable; many fine, medium, and coarse roots; 2 percent rounded quartz gravel; very strongly acid; clear smooth boundary.

Bt—8 to 17 inches; yellowish brown (10YR 5/8) clay loam; moderate fine subangular blocky structure; friable, slightly sticky; common fine, medium, and coarse roots; 2 percent rounded quartz gravel; few distinct clay films on ped faces and clay bridging between sand grains; very strongly acid; clear smooth boundary.

Bx—17 to 36 inches; yellowish brown (10YR 5/8) loam; many fine, medium, and coarse pale brown (10YR 6/3) and many fine distinct light gray (10YR 7/2) mottles; strong medium and coarse platy structure; gray (10YR 6/1) clay fills the polygonal rings; very firm and brittle; 10 percent rounded quartz gravel; common fine and medium vesicular pores; very strongly acid; gradual smooth boundary.

2B't—36 to 52 inches; brownish yellow (10YR 6/8) clay loam; common fine and medium distinct pale brown (10YR 6/3) and yellowish red (5YR 5/6) mottles; weak medium and coarse subangular blocky

structure; friable, slightly plastic, slightly sticky; common distinct and prominent clay films on vertical ped faces; 5 percent rounded quartz gravel; strongly acid; abrupt smooth boundary.

3C—52 to 72 inches; mottled brown, gray, and yellow very gravelly sandy loam; massive; very friable; 45 percent rounded quartz gravel; strongly acid.

The solum thickness ranges from 40 to 60 inches. The depth to the fragipan ranges from 14 to 30 inches. The depth to bedrock is more than 60 inches. Rock fragments of rounded quartz gravel make up 0 to 10 percent of the A horizon and upper part of the B horizon and from 1 to 35 percent of the fragipan and the lower part of the B horizon. The C horizon is 1 percent to at least 50 percent quartz gravel. The substratum is commonly stratified Coastal Plain sediments, but at the western limits of the Coastal Plain it ranges to loamy residuum from the Piedmont schist and gneiss. The soil is very strongly acid or strongly acid.

The A horizon has hue of 10YR or 2.5Y, value of 3 through 5, and chroma of 2 through 4. The A horizon is sandy loam, loam, or silt loam.

The E horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 or 4. It is sandy loam, loam, or silt loam.

The Bt horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 5 or 6, and chroma of 4 through 8. It is loam, sandy clay loam, or clay loam.

The Bx horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 through 6, and chroma mainly of 3 through 6. The Bx horizon commonly has low-chroma mottles. It is sandy loam, loam, or sandy clay loam in the fine earth fraction.

The C horizon is commonly mottled in shades of brown, yellow, red, and gray. It ranges from gravelly sand through clay in individual strata.

Nestoria Series

The soils of the Nestoria series are shallow and well drained. They formed in materials weathered from Triassic red shale, siltstone, and sandstone of the northern part of the Piedmont Plateau. Slopes range from 7 to 50 percent.

The Nestoria soils commonly are near the Albano, Arcola, Manassas, and Panorama soils. The Nestoria soils are on higher positions and are better drained than the Albano soils, and they have a thinner solum than the Arcola, Manassas, and Panorama soils.

Typical pedon of Nestoria gravelly silt loam, 7 to 25 percent slopes, about 150 feet west of Route 677 and about 1,200 feet north of the junction of Routes 677 and 234:

Ap—0 to 8 inches; reddish brown (2.5YR 4/4) gravelly silt loam; moderate fine granular structure; very friable; many fine and medium roots; 25 percent siltstone gravel; strongly acid; abrupt smooth boundary.

Bt—8 to 14 inches; reddish brown (2.5YR 4/4) very gravelly silt loam; weak fine subangular blocky structure; friable; many fine roots; common distinct clay films on ped faces; 40 percent siltstone gravel; few fine and very fine mica flakes; strongly acid; clear smooth boundary.

C—14 to 18 inches; reddish brown (2.5YR 4/4) very gravelly silt loam; massive; very friable; common fine roots; 50 percent siltstone gravel and siltstone channers; fine and very fine mica flakes; strongly acid; clear irregular boundary.

Cr—18 to 30 inches; reddish brown (2.5YR 4/4) fractured weathered interbedded Triassic siltstone and fine grained sandstone.

R—30 inches; hard Triassic red beds.

The thickness of the solum ranges from 10 to 20 inches. The depth to the Cr horizon ranges from 10 to 20 inches, and the depth to bedrock ranges from 20 to 40 inches. Rock fragments of siltstone, shale, and sandstone make up 15 to 50 percent of the A horizon and 35 to 75 percent of the B and C horizons. The fine earth fraction of the textural control section is more than 50 percent silt and very fine sand. The mineralogy of the sand and silt fractions is dominated by iron oxides, quartz, and muscovite mica. The soil ranges from very strongly acid through moderately acid unless limed.

The A or Ap horizon has hue of 10YR, 2.5YR, or 5YR, value of 3 or 4, and chroma mainly of 3 or 4. Some thin A horizons include chroma of 2. The A horizon is silt loam or loam in the fine earth fraction.

Some pedons have an E horizon that has hue of 10YR, 2.5YR, or 5YR, value of 3 through 5, and chroma of 3 or 4. It is silt loam or loam in the fine earth fraction.

The Bt horizon has hue of 10YR, 2.5YR, or 5YR, value of 3 or 4, and chroma of 3 through 6. It is silt loam or loam in the fine earth fraction.

The C horizon has hue of 10YR or 2.5YR, value of 3 or 4, and chroma of 3 through 6. It is silt loam or loam in the fine earth fraction.

The Cr horizon is dense in place, but the well weathered red beds can be dug with hand tools. The bedrock is not removable with hand equipment.

Oakhill Series

The soils of the Oakhill series are moderately deep and well drained. They formed in residuum weathered from diabase and basalt of the Culpeper Basin. They are on low ridges and side slopes on diabase dikes and basalt flows. Slopes range from 2 to 25 percent.

The Oakhill soils commonly are near the Jackland, Montalto, Oatlands, and Sudley soils. The Oakhill soils have more rock fragments in the control section than those soils.

Typical pedon of Oakhill gravelly silt loam, in an area of Legore-Oakhill complex, 2 to 7 percent slopes, about ¾ mile south of Route 234 and about 1,600 feet east of Route 15:

Ap—0 to 8 inches; dark brown (10YR 4/3) gravelly silt loam; moderate fine and medium granular structure; very friable; many fine, medium, and coarse roots; 25 percent angular basalt gravel; strongly acid; clear smooth boundary.

Bt—8 to 25 inches; strong brown (7.5YR 5/8) very gravelly loam; weak fine subangular blocky structure; friable, slightly plastic, sticky; many fine and medium roots; common distinct clay films on faces of peds; 45 percent angular basalt gravel; 2 percent cobbles; moderately acid; gradual smooth boundary.

C—25 to 34 inches; variegated yellowish brown (10YR 5/6), dark yellowish brown (10YR 3/4), white (5Y 8/2), and olive (5Y 5/3) very gravelly sandy loam; massive; friable; common fine and medium roots; 55 percent basalt gravel; common iron-manganese coatings and fine concretions; slightly acid; clear smooth boundary.

Cr—34 to 45 inches; olive yellow (5Y 6/8) partially weathered basalt.

R—45 inches; basalt bedrock.

The solum thickness ranges from 18 to 36 inches. The depth to the Cr horizon ranges from 20 to 40 inches. The depth to bedrock ranges from 40 to 60 inches. Rock fragments or basalt gravel make up 2 to 35 percent of the A horizon, 35 to 55 percent of the B horizon, and 35 to 90 percent of the C horizon. The content of common angular basalt cobbles is 0 to 15 percent. This soil is very strongly acid or strongly acid in the A horizon unless limed, and moderately acid through neutral in the lower part of the B horizon and in the C horizon.

The Ap horizon mainly has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 through 6. Some pedons have a thin A horizon that has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 0 through 2. The A horizon is loam or silt loam in the fine earth fraction.

Some pedons have an E horizon that has hue of 5YR, 7.5YR, or 10YR, value of 4 through 6, and chroma of 3 through 6. It is loam or silt loam in the fine earth fraction.

The Bt horizon mainly has hue of 5YR, 7.5YR, or 10YR, value of 5 or 6, and chroma of 4 through 8. Redder mottling is common in some pedons. The Bt horizon is loam or clay loam in the fine earth fraction.

The C horizon is variegated in shades of yellow, olive, brown, red, and white. It is sandy loam, silt loam, or loam in the fine earth fraction. The Cr horizon is partially weathered basalt or diabase.

Oatlands Series

The soils of the Oatlands series are moderately deep and well drained. They formed in residuum weathered from Triassic and Jurassic sandstone and conglomerate of the Culpeper Basin in the northern part of the Piedmont Plateau. They are on ridges and side slopes. Slopes range from 2 to 15 percent.

The Oatlands soils commonly are near the Manassas, Nestoria, Sudley, and Panorama soils. The Oatlands soils are shallower to bedrock than the Manassas, Panorama, and Sudley soils and are deeper to bedrock than the Nestoria soils.

Typical pedon of Oatlands loam, in an area of Sudley-Oatlands complex, 7 to 15 percent slopes, about 1⅓ miles south of Route 234 and about 1,500 feet east of Route 15, in J.S. Long Park:

Ap—0 to 8 inches; reddish brown (5YR 4/4) loam; moderate fine granular structure; very friable; many fine and medium roots; 10 percent partially weathered sandstone and conglomerate gravel; strongly acid; clear smooth boundary.

Bt—8 to 19 inches; reddish brown (2.5YR 4/4) loam; weak fine and medium subangular blocky structure; friable; many fine roots; 13 percent partially weathered sandstone and conglomerate gravel; common iron-manganese concretions and films; few distinct clay films on faces of peds; strongly acid; gradual wavy boundary.

C1—19 to 28 inches; reddish brown (2.5YR 4/4) very gravelly loam; mottled yellow, green, and red; massive; very friable; common fine roots; common iron-manganese films and concretions; 40 percent partially weathered sandstone and conglomerate gravel; 5 percent partially weathered cobbles; few medium yellowish red (5YR 5/8) clay flows; strongly acid; clear irregular boundary.

C2—28 to 36 inches; reddish brown (2.5YR 4/4) extremely gravelly loam; mottled yellow, green, and red; massive; very friable; common iron-manganese films and concretions; 60 percent partially weathered sandstone and conglomerate gravel; 10 percent partially weathered cobbles; few medium yellowish red (5YR 5/8) clay flows; strongly acid; clear irregular boundary.
R—36 inches; fractured Triassic sandstone and conglomerate.

The solum thickness ranges from 15 to 30 inches. The depth to bedrock is 20 to 40 inches. Rock fragments of partially weathered Triassic and Jurassic sandstone and conglomerate make up about 2 to 35 percent of the solum and 80 percent of the C horizon. Some pedons have a Cr horizon with an irregular lower boundary and with tonguing of C horizon material. The soil is very strongly acid to moderately acid unless limed.

The Ap horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 3 or 4. Some pedons have an A horizon that has hue of 5YR or 7.5YR, value of 2 or 3, and chroma of 0 through 2. The Ap or A horizon is oam, sandy loam, or silt loam in the fine earth fraction.

Some pedons have an E horizon that has hue of 5YR or 7.5YR, value of 3 through 6, and chroma of 3 through 6. The E horizon is loam, sandy loam, or silt loam in the fine earth fraction.

The Bt horizon has hue of 2.5YR or 5YR, value mainly of 3 or 4, and chroma mainly of 3 through 6. Mottles with higher value and chroma are common in some pedons. The Bt horizon is loam, sandy loam, or clay loam in the fine earth fraction.

The C horizon has hue of 2.5YR, 5YR, or 7.5YR and is commonly multicolored in shades of red, brown, green, yellow, and black. The C horizon is sandy loam, loam, or silt loam in the fine earth fraction.

Some pedons have a Cr horizon that is partially weathered Triassic or Jurassic sandstone and conglomerate.

Occoquan Series

The soils of the Occoquan series are deep and somewhat excessively drained and well drained. They formed in materials weathered from granite and granite gneiss. Occoquan soils are on uplands of the northern part of the Piedmont Plateau. Slopes range from 7 to 50 percent.

The Occoquan soils commonly are near the Buckhall, Fairfax, Hoadly, and Neabsco soils. The Occoquan soils have a thinner solum and less clay than the Buckhall and Fairfax soils, are better drained than the Hoadly soils, and do not have the fragipan typical of the Neabsco soils.

Typical pedon of Occoquan sandy loam, 7 to 25 percent slopes, 2 miles northwest of Route 663, 450 feet south of Occoquan Club Drive:

O1—2 inches to 0; partially decomposed hardwood leaves and twigs.
A—0 to 2 inches; dark grayish brown (10YR 4/2) sandy loam; weak fine granular structure; very friable; many fine, medium, and coarse roots; 6 percent angular quartz gravel; 1 percent angular cobbles; few fine mica flakes; extremely acid; clear smooth boundary.
E—2 to 9 inches; pale brown (10YR 6/3) sandy loam; weak medium and fine granular structure; very friable; many fine and medium roots; 6 percent angular quartz gravel; 1 percent angular cobbles; few fine mica flakes; extremely acid; clear smooth boundary.
Bt—9 to 17 inches; strong brown (7.5YR 5/8) loam; common fine and medium distinct brownish yellow (10YR 6/6) and yellowish red (5YR 5/8) mottles; weak fine and medium subangular blocky structure; friable; many fine, medium, and coarse roots; common distinct clay films on ped faces; common fine mica flakes; 3 percent angular quartz gravel; extremely acid; clear smooth boundary.
C—17 to 53 inches; multicolored brown, yellow, red, and white sandy loam; massive saprolite from granite gneiss; very friable; common fine roots; few thin clay flows in the upper 20 inches; common fine mica flakes; 3 percent angular quartz gravel; very strongly acid; clear irregular boundary.
Cr—53 to 72 inches; partially weathered granite gneiss with tongues of sandy loam C material to 72 inches or more.

The solum thickness ranges from 12 to 24 inches. The depth to partially weathered bedrock ranges from 40 to 60 inches. The depth to hard bedrock is more than 60 inches. The content of angular quartz fragments is 1 to 15 percent throughout the soil. Few to many mica flakes are in the B and C horizons. The soil is extremely acid through strongly acid unless limed.

The A horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 through 4. It is loam, sandy loam, or coarse sandy loam. The E horizon has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 3 or 4. It is loam, sandy loam, or coarse sandy loam.

The Bt horizon has hue of 5YR, 7.5YR, or 10YR, value of 5 or 6, and chroma of 4 through 8. It is loam, sandy loam, sandy clay loam, or clay loam.

The C horizon is multicolored in shades of red, yellow, brown, and white. It is loam, sandy loam, or loamy sand over a Cr horizon of partially weathered granite gneiss.

Orenda Series

The soils of the Orenda series are very deep and well drained. They formed in residuum weathered from hornblende gneiss and hornblende schist. The soils are on uplands of the northern part of the Piedmont Plateau. Slopes range from 7 to 15 percent.

The Orenda soils commonly are near the Minnieville and Spriggs soils. The Orenda soils are not as red in the B horizon as the Minnieville soils and have a thicker solum and are deeper to rock than the Spriggs soils.

Typical pedon of Orenda loam, 7 to 15 percent slopes, about 1,200 feet north of the south branch of Quantico Creek and about 80 feet east of Park Central Road, in Prince William Forest Park:

Oi—1 inch to 0; partially decomposed hardwood leaves, pine needles, and twigs.

Ap—0 to 8 inches; dark brown (7.5YR 4/4) loam; moderate fine and medium granular structure; very friable; many fine, medium, and coarse roots; 5 percent angular and subrounded vein quartz gravel; very strongly acid; abrupt smooth boundary.

Bt1—8 to 31 inches; strong brown (7.5YR 5/6) clay; moderate fine and medium subangular blocky structure; very firm, very plastic, sticky; many fine and medium roots; common distinct clay films on ped faces; 1 percent angular vein quartz gravel; common fine and medium iron-manganese concretions; few fine mica flakes; strongly acid; clear wavy boundary.

Bt2—31 to 40 inches; yellowish red (5YR 5/6) clay loam; common medium distinct brownish yellow (10YR 6/8) and yellowish brown (10YR 5/8) mottles; firm, plastic, sticky; common fine and medium roots; many distinct clay films on ped faces; common iron-manganese concretions and streaks; 5 percent partially weathered gneiss fragments; common fine mica flakes; strongly acid; gradual wavy boundary.

C1—40 to 46 inches; yellowish red (5YR 5/6) sandy clay loam; common medium and coarse distinct brownish yellow (10YR 6/8) and brown (10YR 5/3) mottles and few red (2.5YR 4/8) mottles; massive; friable, slightly plastic, sticky; few fine roots; many distinct clay flows in crevices; 5 percent partially weathered hornblende gneiss fragments; common fine mica flakes; common iron-manganese streaks; moderately acid; gradual smooth boundary.

C2—46 to 66 inches; strong brown (7.5YR 5/8) sandy loam; many medium and coarse mottles in shades of red, yellow, brown, and black; massive; friable, sticky; few fine roots; common fine mica flakes; few thin clay flows in crevices; 20 percent partially weathered hornblende gneiss fragments; common iron-manganese streaks; moderately acid; clear irregular boundary.

Cr—66 inches; partially weathered hornblende gneiss.

The solum thickness ranges from about 24 to 50 inches. The depth to bedrock is from 5 to 15 feet. Rock fragments of angular vein quartz make up 0 to 15 percent of the surface layer and 1 to 5 percent of the B and C horizons. Partially weathered hornblende gneiss or hornblende schist fragments make up 2 to 25 percent of the lower part of the B horizon and the C horizon. Few to common mica flakes are in the B and C horizons. The soil is strongly acid or moderately acid unless limed.

The A or Ap horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 or 5, and chroma of 2 through 6. It is silt loam or loam.

Some pedons have an E horizon that has hue of 5YR, 7.5YR, or 10YR, value of 4 or 6, and chroma of 3 through 6. It is loam or silt loam.

The Bt horizon has hue of 5YR, 7.5YR, or 10YR, value of 5 or 6, and chroma mainly of 4 through 8. High- and low-chroma parent-material mottling is common in the lower part of the B horizon. The Bt horizon is clay or clay loam.

The C horizon is commonly multicolored in shades of red, yellow, brown, white, and black. It is loam, silt loam, sandy loam, or sandy clay loam in the fine earth fraction.

Panorama Series

The soils of the Panorama series are deep and well drained. They formed in materials weathered from red shale, siltstone, and fine grained sandstone rocks. Panorama soils are on uplands of the Triassic red beds of the northern part of the Piedmont Plateau. Slopes range from 2 to 15 percent.

The Panorama soils commonly are near the Albano, Arcola, Manassas, and Nestoria soils. The Panorama soils are better drained than the Albano and Manassas soils, are deeper to rock than the Nestoria soils, and

have a thicker solum than the Arcola soils.

Typical pedon of Panorama silt loam, 2 to 7 percent s opes. n Manassas Battlefield Park, approximately 500 feet east of Route 234 and 440 yards northeast of the junction of Routes 234 and 29-211:

Ap—0 to 10 inches; reddish brown (5YR 4/3) silt loam; moderate fine granular structure; friable; many fine and medium roots; 2 percent subrounded quartz and siltstone fragments up to 1 inch thick; moderately acid; abrupt smooth boundary.

Bt1—10 to 19 inches; reddish brown (2.5YR 4/4) silty clay loam; moderate fine subangular blocky structure; friable, slightly plastic, slightly sticky; many fine roots; 2 percent subrounded quartz and siltstone fragments up to 1 inch thick; many fine pores; common distinct clay films on ped faces; slightly acid; gradual smooth boundary.

2Bt2—19 to 29 inches; weak red (10R 4/4) silty clay loam; moderate fine and medium subangular blocky structure; firm, slightly plastic, slightly sticky; common fine roots; thin prominent clay films on ped faces; few fine and medium vesicular pores; 8 percent partially weathered red siltstone fragments up to 1 inch thick; very strongly acid; gradual smooth boundary.

2Bt3—29 to 38 inches; weak red (10R 4/4) clay loam; weak medium subangular blocky structure; firm, slightly plastic, slightly sticky; few fine roots; 10 percent partially weathered red siltstone fragments up to 1 inch thick; many distinct and prominent clay films on vertical ped faces; few fine and medium pores; few fine mica flakes; very strongly acid; clear smooth boundary.

2BC—38 to 55 inches; weak red (10R 4/4) and reddish brown (4YR 5/4) very channery silty clay loam; massive; firm, sticky; common medium and thin clay films on faces of coarse fragments; 40 percent partially weathered red siltstone and sandstone fragments; few fine roots; very strongly acid; abrupt smooth boundary.

2Cr—55 to 60 inches; weak red (10R 4/4) fractured partially weathered interbedded Triassic siltstone and fine grained sandstone.

The thickness of the solum ranges from 26 to 52 inches. The depth to the Cr horizon ranges from 40 to 60 inches, and the depth to bedrock is more than 5 feet. The content of rock fragments of subrounded quartz and red beds ranges up to 5 percent above the lithologic discontinuity, and the content of rock fragments of red beds ranges up to 15 percent in the Bt horizon below the discontinuity. Rock fragments of red beds make up 25 to 45 percent of the C horizon. The fine earth fraction of the textural control section is more than 50 percent silt and very fine sand. The soil is very strongly acid or strongly acid unless limed.

The A or Ap horizon mainly has hue of 2.5YR, 5YR, or 7.5YR, value of 4 or 5, and chroma of 3 through 6. Some pedons have a thin A horizon that is neutral or has value of 2 or 3 and chroma of 0 through 2. The A horizon is silt loam or loam.

Some pedons have an E horizon that has hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 3 through 6. It is silt loam or loam.

The Bt horizon has hue of 10R, 2.5YR, or 5YR, value of 3 through 5, and chroma of 4 through 6. It mainly is silty clay loam, but the range in texture includes thin horizons of silty clay.

The 2Bt horizon has hue of 10R, 2.5YR, or 5YR, value of 3 through 5, and chroma mainly of 3 through 6. It is silty clay loam, silt loam, or clay loam. Mottles of lower chroma are in the lower part of the 2Bt horizon in some pedons.

Some pedons have a C horizon that has hue of 10R, 2.5YR, or 5YR, value of 3 through 5, and chroma of 4 through 6. It is silt loam or silty clay loam in the fine earth fraction.

The Cr horizon is weathered red beds.

Quantico Series

The soils of the Quantico series are very deep and well drained. They formed in stratified sediments of sand, silt, and clay. Quantico soils are on uplands of the northern part of the Coastal Plain. Slopes range from about 2 to 25 percent.

The Quantico soils commonly are near the Buckhall, Fairfax, Lunt, and Neabsco soils. The Quantico soils are underlain by stratified sediments; the Buckhall and Fairfax soils are underlain by Piedmont residuum. The Quantico soils have a thicker solum than the Lunt soils and do not have the fragipan typical of the Neabsco soils.

Typical pedon of Quantico sandy loam, 2 to 7 percent slopes, in Prince William Forest Park, about 2,200 feet of south of Route 234, about 300 feet west of Old Mine Road, and about 75 feet south of Burma Road:

Oi—1 inch to 0; partially decomposed hardwood leaves and twigs.

A—0 to 1 inch; brown to dark brown (10YR 4/3) sandy loam; moderate fine and very fine granular structure; very friable; many fine and medium roots;

3 percent rounded and subrounded quartz gravel; very strongly acid; clear smooth boundary.

E—1 to 13 inches; light yellowish brown (10YR 6/4) sandy loam; moderate fine and very fine granular structure; very friable; many fine and medium roots; 3 percent rounded and subrounded quartz gravel; very strongly acid; clear smooth boundary.

Bt1—13 to 18 inches; strong brown (7.5YR 5/6) clay loam; moderate fine and medium subangular blocky structure; firm, slightly plastic, slightly sticky; common fine and medium roots; few faint clay films on ped faces; 10 percent rounded quartz gravel; very strongly acid; clear smooth boundary.

Bt2—18 to 32 inches; strong brown (7.5YR 5/8) clay; moderate fine and medium subangular blocky structure; firm, plastic, sticky; common fine and medium roots; common distinct clay films on ped faces; 3 percent rounded quartz gravel; very strongly acid; gradual smooth boundary.

Bt3—32 to 47 inches; strong brown (7.5YR 5/3) clay; common medium and fine reddish yellow (5YR 7/8) and red (2.5YR 5/6) mottles; weak fine and medium subangular blocky structure; firm, slightly plastic, slightly sticky; few fine roots; common faint and distinct clay films on ped faces; 3 percent rounded quartz gravel; very strongly acid; gradual smooth boundary.

C—47 to 72 inches; strong brown (7.5YR 5/8) sandy clay; many fine to coarse light red (2.5YR 6/8), white (5YR 8/1), and red (5YR 5/8) mottles; massive; very friable, slightly plastic, slightly sticky; few thin and medium clay flows in the upper 10 inches; 3 percent rounded quartz gravel; dominantly partially weathered feldspathic sand; very strongly acid.

The solum thickness ranges mainly from 30 to 60 inches. The depth to bedrock is more than 60 inches. The substratum is stratified Coastal Plain sediments, dominantly of feldspathic sands. Rock fragments of rounded to subrounded quartz gravel make up 1 to 15 percent of the solum and substratum. The soil is very strongly acid or strongly acid unless limed.

The A horizon is neutral or has hue of 10YR, 7.5YR, or 2.5Y, value of 2 through 5, and chroma of 0 through 4. It is sandy loam, sandy clay loam, clay loam, or loam.

The E horizon has hue of 10YR, 7.5YR, or 2.5Y, value of 4 through 6, and chroma of 3 or 4. It is loam or sandy loam.

The Bt horizon has hue of 5YR, 7.5YR, or 10 YR, value of 4 through 6, and chroma mainly of 4 through 8. Lower chroma parent-material mottling is common in some pedons. The Bt horizon is clay loam through clay.

The C horizon is multicolored in shades of brown, yellow, red, and white. It is sandy loam through sandy clay.

Reaville Series

The soils of the Reaville series are moderately deep and moderately well drained and somewhat poorly drained. They formed in materials weathered from red shale, siltstone, and fine grained sandstone rocks. Reaville soils are in the Culpeper Basin. Slopes range from 0 to 4 percent.

The Reaville soils commonly are near the Albano, Calverton, Dulles, and Nestoria soils. The Reaville soils are at higher landscape positions than the Albano, Calverton, and Dulles soils and have a thicker solum and are deeper to rock than the Nestoria soils.

Typical pedon of Reaville silt loam, 0 to 4 percent slopes, about 2,300 feet southwest of Route 661 and about 2,000 feet northwest of Route 28:

Ap—0 to 8 inches; brown to dark brown (7.5YR 4/4) silt loam; moderate fine granular structure; friable, slightly sticky; many fine roots; 5 percent siltstone fragments up to ½ inch long; few dark brown (7.5YR 3/2) iron-manganese concretions; strongly acid; abrupt smooth boundary.

Bt1—8 to 12 inches; reddish brown (5YR 5/4) silt loam; few medium and fine pale brown (10YR 6/3) and reddish brown (10YR 4/4) mottles; weak fine subangular blocky structure; friable, slightly plastic, slightly sticky; many fine roots; common distinct clay films on ped faces; 5 percent red siltstone fragments up to ½ inch long; few fine pores; strongly acid; clear wavy boundary.

Bt2—12 to 18 inches; reddish brown (2.5YR 4/4) channery silty clay loam; moderate fine and medium subangular blocky structure; friable, slightly plastic, sticky; many fine roots; common prominent clay films on ped faces; 25 percent red siltstone fragments up to 2 inches long; common fine pores; few dark brown (7.5YR 3/2) to black (7.5YR 2/2) iron-manganese concretions; strongly acid, clear smooth boundary.

C—18 to 31 inches; dark reddish brown (2.5YR 3/4) very channery silt loam; massive; friable; few thin to thick clay flows in crevices; pinkish gray (5YR 7/2) and black (7.5YR 2/2) coatings on shale faces; 40 percent red siltstone fragments up to 2 inches long; strongly acid; clear smooth boundary.

R—31 incnes; partially weathered red Triassic siltstone; b ack (2.5YR 5/1) to pinkish gray (5YR 7/2) coatings on shale fragments in the upper part.

The solum thickness ranges from 12 to 24 inches. The depth to bedrock ranges from 20 to 40 inches. Rock fragments of red shale or fine grained sandstone make up 2 to 15 percent of the A horizon, up to 45 percent of the Bt horizon, and 30 to 70 percent of the C horizon. The soil is strongly acid through slightly acid unless limed.

The A horizon has hue of 2.5YR, 5YR, or 7.5YR, value of 3 through 5, and chroma of 1 through 4. It is silt loam or loam.

Some pedons have an E horizon that has hue of 2.5YR, 5YR, or 7.5YR, value of 4 through 6, and chroma of 2 through 4. It is silt loam or loam in the fine earth fraction.

The Bt horizon has hue of 10R, 2.5YR, or 5YR, value of 3 through 6, and chroma mainly of 3 or 4. Low-chroma and high-chroma mottles are common. The Bt horizon is silt loam or silty clay loam in the fine earth fraction.

The C horizon has hue of 2.5YR, 5YR, or 7.5YR, value of 3 through 5, and chroma mainly of 1 through 4. Low-chroma mottling and coatings are common. The C horizon is loam or si t loam in the fine earth fraction.

Rowland Series

The soils of the Rowland series are deep and somewhat poorly drained and moderately well drained. They formed in alluvium washed from silty materials of the Triassic region of the Piedmont Plateau. They are on flood plains of the major streams of the county, such as Bull Run, Broad Run, Cedar Run, Kettle Run, and Slate Run. S opes range from 0 to 2 percent.

The Rowland soils commonly are near the Arcola, Bermudian, Nestoria, and Panorama soils. The Rowland soils are not so well drained as the Bermudian soils. The Arcola, Panorama, and Nestoria soils are on upland ridgecrests and side slopes of the Triassic region.

Typical pedon of Rowland silt loam, 0 to 2 percent slopes, 600 feet northeast of Route 653 and 50 feet north of Slate Run:

Ap—0 to 11 inches; dark reddish brown (5YR 3/4) silt loam; moderate medium and fine granular structure; friable; many fine roots; common black (10YR 2/1) concretions in the lower portion; moderately acid; abrupt smooth boundary.

Bw1 —11 to 18 inches; dark reddish brown (5YR 3/4) silt loam; weak medium subangular blocky structure; friable; common fine roots; common fine dark brown (7.5YR 4/4) and black (10YR 2/1) iron-manganese concretions; moderately acid; clear smooth boundary.

Bw2—18 to 28 inches; reddish brown (5YR 4/4) silty clay loam; common fine distinct pinkish gray (5YR 6/2) mottles; weak medium and coarse subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; common dark brown (7.5YR 4/4) and black (10YR 2/1) iron-manganese concretions; moderately acid; clear smooth boundary.

2C1—28 to 48 inches; brown (7.5YR 5/4) channery silty clay loam; reddish brown (5YR 4/4) and pinkish gray (5YR 6/2) mottles; massive; friable, slightly sticky, slightly plastic; few fine roots; 20 percent red (2.5YR 4/6) siltstone fragments up to 1 inch thick; moderately acid; abrupt smooth boundary.

2C2—48 to 62 inches; highly weathered saprolite from red (2.5YR 4/6) siltstone.

The solum thickness ranges from 24 to 40 inches. The depth to hard bedrock is more than 60 inches. Rock fragments of red siltstone make up 1 to 10 percent of the B horizon and 0 to 25 percent of the C horizon. The soil ranges from very strongly acid through moderately acid unless limed.

The A horizon has hue of 2.5YR, 5YR, or 7.5YR, value of 3 through 5, and chroma of 3 or 4. It is loam or silt loam.

The B horizon has hue of 2.5YR, 5YR, or 7.5YR, value of 3 through 5, and chroma mainly of 3 or 4. Distinct low- and high-chroma mottles are within 24 inches of the surface. The B horizon is loam, silt loam, or silty clay loam.

The C horizon has hue of 2.5YR, 5YR, or 7.5YR, value of 3 through 5, and chroma mainly of 3 or 4. Low-chroma mottling is common. The C horizon is sandy loam, silty clay loam, or silt loam in the fine earth fraction.

Spriggs Series

The soils of the Spriggs series are moderately deep and well drained. They formed in materials weathered from hornblende gneiss and hornblende schist. Spriggs soils are on uplands of the northern part of the Piedmont Plateau. Slopes range from 15 to 50 percent.

The Spriggs soils commonly are near the Minnieville, Orenda, Buckhall, and Elioak soils. The Spriggs soils have a thinner subsoil and less clay than those soils.

Typical pedon of Spriggs silt loam, 15 to 25 percent

slopes, in Prince William Forest Park, 1 mile south of Route 234, about 300 feet west of the road to camp No. 4:

Oi—1 inch to 0; partially decomposed hardwood leaves and twigs.
A—0 to 2 inches; brown to dark brown (10YR 4/3) silt loam; moderate fine and very fine granular structure; very friable; many fine, medium, and coarse roots; 2 percent angular vein quartz gravel; very strongly acid; clear smooth boundary.
E—2 to 8 inches; yellowish brown (10YR 5/6) silt loam; moderate fine and very fine granular structure; very friable; many fine, medium, and coarse roots; 1 percent angular vein quartz gravel; very strongly acid; clear smooth boundary.
Bt—8 to 18 inches; strong brown (7.5YR 5/8) clay loam; moderate fine subangular blocky structure; firm, slightly plastic; many fine and medium roots; few coarse roots; common distinct clay films on ped faces; few fine and medium continuous pores; few fine and medium iron-manganese concretions; 8 percent partially weathered hornblende gneiss fragments; 1 percent angular vein quartz gravel; few fine mica flakes; strongly acid; clear smooth boundary.
C—18 to 32 inches; yellowish red (5YR 5/8) gravelly loam; high- and low-chroma parent-material mottling; massive; friable to firm; common fine and medium roots; many thin and medium clay flows in crevices; 35 percent partially weathered gneiss fragments; few angular quartz pebbles; few fine mica flakes; strongly acid; gradual irregular boundary.
Cr—32 to 48 inches; partially weathered black, brown, green, yellow, and white hornblende gneiss; firm in place; crushes to sandy loam; clear irregular boundary.
R—48 inches; hornblende gneiss bedrock.

The solum thickness ranges from 12 to 24 inches. The depth to the Cr horizon ranges from 20 to 40 inches, and the depth to bedrock ranges from 40 to 60 inches. The substratum is saprolite from hornblende gneiss or schist. Rock fragments of partially weathered gneiss or schist fragments make up 3 to 35 percent of the lower part of the B horizon and the C horizon. The content of quartz gravel ranges from 1 to 5 percent. The soil is very strongly acid to moderately acid unless limed.

The A horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 3 or 4, and chroma of 2 through 4. It is loam or silt loam.

The E horizon has hue of 7.5YR or 10YR, value of 4 or 6, and chroma of 3 through 6. It is loam or silt loam.

The Bt horizon has hue of 5YR, 7.5YR, or 10YR, value of 5 or 6, and chroma of 4 through 8. It is loam, silt loam, clay loam, or silty clay loam in the fine earth fraction.

The C horizon is commonly multicolored in shades of red, yellow, brown, and white. It is loam, sandy loam, or silt loam in the fine earth fraction.

Stumptown Series

The soils of the Stumptown series are moderately deep and well drained. They formed partly in slope creep and partly in residuum weathered from interbedded quartzite, quartz mica schist, and phyllite. The soils are on ridges, ridge points, and convex side slopes of the northern portion of the Bull Run anticlinorium. Slopes range from 7 to 50 percent.

The Stumptown soils commonly are near the Airmont and Weverton soils on the upper slopes and the Braddock soils on the lower slopes. The Stumptown soils do not have the fragipan typical of the Airmont soils. The bedrock in the Stumptown soils is at a shallower depth than in the Weverton soils. The Stumptown soils have more rock fragments in the control section than the Braddock soils.

Typical pedon of Stumptown very flaggy loam, 7 to 25 percent slopes, about 100 feet west of Jackson Drive, about 200 feet north of Sumney Drive, and 1½ miles north of Log Mill Road:

Oi—1 inch to 0; partially decomposed hardwood leaves and twigs.
A—0 to 2 inches; dark grayish brown (10YR 4/2) very flaggy loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; 45 percent quartzite flagstones; very strongly acid; clear smooth boundary.
E—2 to 12 inches; light yellowish brown (10YR 6/4) very flaggy loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; 45 percent quartzite gravel and flagstones; very strongly acid; clear irregular boundary.
Bt—12 to 20 inches; brownish yellow (10YR 6/6) very flaggy clay loam; common strong brown (7.5YR 5/6) streaks and mottles; weak fine and medium subangular blocky structure; friable; common fine, medium, and coarse roots; few distinct clay films on

ped faces; many fine mica flakes; 45 percent quartzite gravel and flagstones; very strongly acid; clear irregular boundary.

C—20 to 27 inches; variegated brown, yellow, red, and white extremely flaggy sandy loam; massive; very friable; many fine and medium roots; many fine mica flakes; 60 percent quartzite flagstones; very strongly acid; clear irregular boundary.

2Cr—27 to 33 inches; interbedded quartzite and partially weathered muscovite mica schist with loamy soil material in rock crevices.

2R—33 inches; bedrock or quartzite and muscovite mica schist.

The solum thickness ranges from 12 to 22 inches. The depth to the 2Cr horizon is 20 to 40 inches, and the depth to bedrock is 20 to 40 inches. Rock fragments of quartzite gravel and flagstone make up 35 to 60 percent of the solum and up to 90 percent of the C horizon. Stones and boulders up to 36 inches in diameter cover 0 to 15 percent of the surface area. This soil is very strongly acid or strongly acid unless limed.

The A horizon has hue of 7.5YR or 10YR, value of 3 through 5, and chroma of 1 through 3. It is silt loam, loam, or sandy loam in the fine earth fraction.

The E horizon has hue of 7.5YR or 10YR, value of 6 or 7, and chroma of 3 through 6. It is loam, silt loam, or sandy loam in the fine earth fraction.

The Bt horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 through 6. Yellower and redder mottling is common in the lower part in some pedons. The Bt horizon is loam or clay loam in the fine earth fraction.

The C horizon is variegated in shades of yellow, brown, red, and white. It is loam, sandy loam, or sandy clay loam in the fine earth fraction.

The 2Cr horizon is interbedded quartzite and partially weathered muscovite schist.

The 2R horizon is hard bedrock and interbedded quartzite and muscovite schist.

Sudley Series

The soils of the Sudley series are very deep and well drained. They formed in residuum weathered from Triassic and Jurassic conglomerate of the Culpeper Basin. The soils are on ridges and side slopes. Slopes range from 2 to 15 percent.

The Sudley soils commonly are near the Arcola, Manassas, Oatlands, and Panorama soils. The Sudley soils are deeper to bedrock than the Oatlands, Arcola, and Panorama soils. The water table in the Sudley soils is at a greater depth than that in the Manassas soils.

Typical pedon of Sudley loam, in an area of Sudley-Oatlands complex, 2 to 7 percent slopes, about 1,600 feet east of Route 15 and about 200 feet south of Route 234, in J.S. Long Park:

Ap—0 to 8 inches; reddish brown (5YR 4/4) loam; moderate fine granular structure; very friable; many fine and medium roots; 2 percent rounded and subrounded quartz and sandstone gravel; moderately acid; clear smooth boundary.

Bt1—8 to 29 inches; yellowish red (5YR 4/6) clay loam; moderate fine and medium subangular blocky structure; firm, slightly plastic; many fine and medium roots; common fine pores; 2 percent rounded and subrounded quartz and sandstone gravel; few black (5YR 5/1) iron-manganese films and concretions; common distinct clay films on ped faces; moderately acid; clear smooth boundary.

Bt2—29 to 42 inches; yellowish red (5YR 4/6) loam; many medium and coarse dark brown (7.5YR 3/4) and reddish brown (2.5YR 4/4) mottles; weak medium and fine subangular blocky structure; friable; common fine roots; common fine pores; common distinct clay films on ped faces; 14 percent partially weathered sandstone gravel; common black (5YR 5/1) iron-manganese films and concretions; strongly acid; gradual smooth boundary.

C1—42 to 52 inches; variegated brown, yellow, red, green, and black loam; massive; very friable; few fine roots; few distinct clay flows; common fine pores; 15 percent partially weathered sandstone and conglomerate gravel; strongly acid; gradual smooth boundary.

C2—52 to 72 inches; brown to dark brown (7.5YR 4/2) gravelly sandy loam; many fine mottles in shades of olive and yellow; massive; friable; few distinct clay flows; 25 percent partially weathered sandstone and conglomerate gravel; strongly acid; clear irregular boundary.

The solum thickness ranges from 20 to 50 inches. The depth to bedrock is greater than 60 inches. Rock fragments of sandstone and conglomerate gravel make up 1 to 15 percent of the solum and up to 30 percent of the C horizon. This soil is very strongly acid through moderately acid unless limed.

The A or Ap horizon has hue of 5YR or 7.5YR, value of 3 through 5, and chroma of 3 or 4. It is loam, sandy loam, or silt loam.

Some pedons have an E horizon that has hue of 5YR

or 7.5YR, value of 4 through 6, and chroma of 3 or 4. It is loam, sandy loam, or silt loam.

The Bt horizon has hue of 2.5YR, 5YR, or 7.5YR, value of 3 through 5, and chroma of 3 through 6. In places parent-material mottling is common in the lower part. The Bt horizon is loam, clay loam, or sandy clay loam.

The C horizon is commonly variegated in shades of red, brown, yellow, green, and white. It is loam, sandy loam, or sandy clay loam in the fine earth fraction.

Sycoline Series

The soils of the Sycoline series are moderately deep and moderately well drained and somewhat poorly drained. They formed from residuum of granulite and hornfels rock of Triassic and Jurassic age. These soils are on upland side slopes in the Culpeper Basin of the northern part of the Piedmont Plateau. Slopes range from 2 to 15 percent.

The Sycoline soils commonly are near the Albano, Arcola, Catlett, and Kelly soils. The Sycoline soils have less clay in the control section than the Albano and Kelly soils. The Sycoline soils do not have the low-chroma drainage mottles in the control section that are typical of the Kelly soils or the redder hue in the Bt horizon typical of the Arcola soils. The Sycoline soils are deeper to rock than the Catlett soils.

Typical pedon of Sycoline silt loam, in an area of Sycoline-Kelly complex, 2 to 7 percent slopes, about ¾ mile southwest of Vint Hill Road and about 500 feet south of Route 28, in hardwood forest:

A—0 to 2 inches; very dark grayish brown (2.5Y 3/2) silt loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; 10 percent angular granulite and hornfels gravel; very strongly acid; clear smooth boundary.

E—2 to 9 inches; grayish brown (2.5Y 5/2) silt loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; 10 percent angular hornfels and granulite gravel; very strongly acid; clear smooth boundary.

Bt1—9 to 22 inches; yellowish brown (2.5Y 5/6) silty clay loam; few fine and medium light gray to gray (10YR 6/1) mottles; moderate fine subangular blocky structure; friable, slightly plastic, slightly sticky; common fine and medium roots; few distinct clay films on ped faces; 8 percent angular hornfels and granulite gravel; strongly acid; clear smooth boundary.

Bt2—22 to 26 inches, mottled light gray to gray (10YR 6/1), yellowish brown (10YR 5/6), olive yellow (2.5Y 6/6), and brownish yellow (10YR 6/6) silty clay loam; moderate medium subangular blocky structure; few fine and medium roots; common distinct and prominent clay films on ped faces; few black iron-manganese coatings; 10 percent angular hornfels and granulite gravel; strongly acid; clear smooth boundary.

C—26 to 33 inches; brownish yellow (10YR 6/8) silt loam; many medium and coarse streaks and mottles of dark gray (10YR 4/1), yellowish brown (10YR 5/4), and olive brown (2.5YR 4/4); massive; friable to firm; 15 percent angular granulite and hornfels gravel; few common plastic clay flows in crevices; strongly acid.

R—33 inches; light gray to gray hornfels and granulite bedrock.

The solum thickness ranges from 20 to 40 inches. The depth to paralithic contact ranges from 20 to 40 inches. The substratum is saprolite from hornfels and granulite. The content of rock fragments of granulite is 0 to 15 percent. The soil is very strongly acid through moderately acid.

The A horizon has hue of 10YR or 2.5Y, value of 3 through 5, and chroma of 1 through 4. It is silt loam.

The E horizon has hue of 10YR, 2.5Y, or 5Y, value of 3 through 6, and chroma of 1 through 8. It is silt loam.

The Bt horizon has hue of 7.5YR, 10YR, 2.5Y, or 5Y, value of 3 through 6, and chroma of 1 through 8. It is silt loam or silty clay loam.

The C horizon is saprolite weathered from granulite and hornfels and is brownish yellow to dark yellowish brown. It is loam or silt loam.

Udorthents

Udorthents consist of deep or very deep, loamy and clayey soil material that is well drained or moderately well drained. Udorthents are mainly on ridges and side slopes along drainageways and consist mostly of areas that have been quarried for sand, gravel, or fill material. Some areas have been excavated to a depth of 30 feet or more, and some have been filled with a combination of soil material and nonsoil material. The areas of Udorthents are throughout the survey area, but most are in or near urban and industrial centers. Slopes range from 0 to 7 percent.

Udorthents commonly are near Albano, Arcola, Dulles, Dumfries, Manassas, Nestoria, and Panorama soils. All those nearby soils have a well defined subsoil.

Because of the variability of Udorthents, a typical pedon is not given. Udorthents are more than 40 inches deep to bedrock. The material ranges mainly from extremely acid through strongly acid. Quartz gravel and ironstone fragments make up as much as 30 percent of some pedons, and common fine flakes of mica are in some pedons.

The surface layer has hue of 5YR through 2.5Y, value of 3 through 5, and chroma of 2 or 3. It ranges from loamy sand to clay. The surface layer commonly is about 2 to 5 inches thick, but it ranges from 2 to 10 inches thick.

The lower layers extend to a depth of more than 40 inches. They have hue of 2.5YR through 10YR, value of 3 through 7, and chroma of 4 through 8. The material ranges from sandy loam to clay. Mottles with hue of 5YR through 2.5Y, value of 3 through 8, and chroma of 1 through 8 are in some pedons.

Watt Series

The soils of the Watt series are moderately deep and somewhat excessively drained. They formed in materials weathered from graphitic schist or graphitic phyllite. Watt soils are on uplands at the eastern edge of the Piedmont Plateau and are along deep drainageways in the Coastal Plain sediments. Slopes range from 15 to 50 percent.

The Watt soils commonly are near the Lunt and Quantico soils. The Watt soils have a thinner solum and less clay than those soils.

Typical pedon of Watt channery silt loam, 15 to 25 percent slopes, in Dumfries, about 600 feet west of Main Street and about 75 feet south of Curtis Drive:

Oi—1 inch to 0; partially decomposed hardwood leaves and twigs.

A—0 to 1 inch; very dark grayish brown (10YR 3/2) channery silt loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; 20 percent partially weathered graphitic schist fragments; extremely acid; abrupt smooth boundary.

E—1 to 7 inches; dark grayish brown (2.5Y 4/2) channery silt loam; moderate fine and medium granular structure; very friable; many fine, medium, and coarse roots; 20 percent partially weathered graphitic schist fragments; many fine mica flakes; extremely acid; clear smooth boundary.

Bw—7 to 16 inches; very dark gray (2.5Y N 3/0) very channery silt loam; weak fine subangular blocky structure; friable; common fine and medium roots; 40 percent partially weathered graphitic schist fragments; many thin silt coatings and few thin patchy films of clay on ped faces; many very fine mica flakes; extremely acid; gradual smooth boundary.

C—16 to 29 inches; black (2.5Y N 2/0) and very dark gray (2.5Y N 3/0) extremely channery silt loam; massive; very friable; common fine roots; 60 percent partially weathered graphitic schist fragments; many fine and very fine mica flakes; extremely acid; clear irregular boundary.

Cr—29 inches; black (2.5Y N 2/0) partially weathered graphitic schist.

The solum thickness ranges from 10 to 20 inches. The depth to bedrock is from 20 to 40 inches. Rock fragments of partially weathered graphitic schist or phyllite make up 15 to 25 percent of the surface layer and 35 to 70 percent of the subsoil and substratum. A few angular quartz pebbles are in some profiles. Few to many fine mica flakes are in the surface layer, subsoil, and substratum. The soil is extremely acid through strongly acid.

The A horizon has hue of 10YR through 5Y, value of 2 through 4, and chroma of 0 through 3. It is loam or silt loam in the fine earth fraction.

The E horizon is neutral or has hue of 10YR through 5Y, value of 2 through 5, and chroma of 0 to 4. It is loam or silt loam in the fine earth fraction.

The Bw horizon has hue of 2.5Y or 5Y, value of 2 through 4, and chroma of 0 through 3. It is silt loam or silty clay loam in the fine earth fraction.

The C horizon has hue of 2.5Y or 5Y, value of 2 through 4, and chroma of 0 through 3 and is commonly streaked with shades of light gray and yellow. It is silt loam in the fine earth fraction.

Waxpool Series

The soils of the Waxpool series are very deep and somewhat poorly drained and poorly drained. They formed on upland flats in residuum weathered from diabase and basalt rocks of the northern part of the Piedmont Plateau. Slopes range from 0 to 2 percent.

The Waxpool soils commonly are near the Haymarket, Jackland, Legore, and Montalto soils. The Waxpool soils have a grayer surface layer and are more poorly drained than the Haymarket, Jackland, or Montalto soils and have a thicker solum and more clay than the Legore soils.

Typical pedon of Waxpool silt loam, 0 to 2 percent slopes, about 0.8 mile west of Route 607 and about 1,150 feet north of Old Warrenton Road:

A—0 to 1 inch; very dark grayish brown (10YR 3/2) silt loam; moderate fine granular structure; friable; many fine, medium, and coarse roots; very strongly acid; clear smooth boundary.

Eg—1 to 9 inches; gray (10YR 5/1) silt loam; common fine and medium dark yellowish brown (10YR 4/4) mottles; moderate fine and medium granular structure; many fine and medium roots; many fine and medium iron-manganese concretions; very strongly acid; clear smooth boundary.

BEtg—9 to 12 inches; light gray to gray (10YR 6/1) clay loam; many fine and medium light yellowish brown (10YR 6/4) mottles; moderate fine subangular blocky structure; firm, slightly plastic, slightly sticky; common fine and medium roots; few distinct clay films on ped faces; common fine and medium vesicular pores; many fine to coarse iron-manganese concretions; few intersecting slickensides; very strongly acid; clear smooth boundary.

Bt1—12 to 23 inches; dark yellowish brown (10YR 4/4) clay; many medium and coarse light gray (10YR 6/1) mottles; moderate coarse subangular blocky structure; very firm, very plastic, very sticky; common fine and medium roots; many prominent clay films on ped faces and many pressure faces; common fine iron-manganese concretions; few intersecting slickensides; very strongly acid; clear smooth boundary.

Bt2—23 to 35 inches; dark yellowish brown (10YR 4/4) clay; many medium and coarse very dark gray (10YR 3/1) mottles; moderate coarse subangular blocky structure; very firm, very plastic, very sticky; common fine and medium roots; many prominent clay films on ped faces and many pressure faces; many intersecting slickensides; neutral; clear smooth boundary.

BCt—35 to 43 inches; dark yellowish brown (10YR 4/4) clay loam; many medium and coarse brownish yellow (10YR 6/6) and black (10YR 2/1) mottles; weak coarse subangular blocky structure; firm, plastic, sticky; few fine roots; 2 percent gravel; many distinct and prominent clay films on ped faces; common fine vesicular pores; mildly alkaline; gradual smooth boundary.

C—43 to 80 inches; brownish yellow (10YR 6/6) saprolite from diabase that crushes easily to loamy sand; many fine and medium mottles in shades of green, black, white, and brown; massive; firm in place but breaks easily to very friable; 5 percent gravel or partly weathered diabase; common fine and medium vesicular pores; moderately alkaline.

The solum thickness ranges from 30 to 60 inches. The depth to bedrock is more than 60 inches. Rock fragments of diabase or basalt gravel and cobbles make up 0 to 10 percent of the solum and 2 to 25 percent of the C horizon. The soil is very strongly acid through moderately acid in the A horizon unless limed, very strongly acid through neutral in the B horizon, and neutral through moderately alkaline in the C horizon.

The A horizon is neutral or has hue of 10YR, 7.5YR, or 2.5Y, value of 3 or 4, and chroma of 0 through 3. It is silt loam or loam.

The E horizon is neutral or has hue of 10YR, 7.5YR, or 2.5Y, value of 5 through 8, and chroma of 0 through 4. It is silt loam or loam.

The B horizon has hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 4 through 8. The B horizon is clay. The BCt horizon is clay loam or sandy clay loam.

The C horizon has hue of 2.5Y or 10YR, value of 4 through 6, and chroma of 4 through 8. It is clay loam, silty clay loam, loam, sandy loam, or loamy sand and is from strongly weathered diabase or basalt.

Weverton Series

The soils of the Weverton series are deep and well drained. They formed partly in slope creep and partly in residuum weathered from interbedded quartzite, muscovite schist, mica schist, and phyllite. They are on ridges and side slopes of the northern portion of Bull Run Mountain. Slopes range from 2 to 50 percent.

The Weverton soils commonly are near the Airmont and Stumptown soils on the upper mountain slopes and the Braddock soils on the lower mountain slopes. The Weverton soils do not have the fragipan typical of the Airmont soils, are deeper to bedrock than the Stumptown soils, and do not have the clayey control section typical of the Braddock soils.

Typical pedon of Weverton very flaggy loam, in an area of Airmont-Weverton complex, 15 to 25 percent slopes, about 250 yards west of Gore Drive:

Oi—1 inch to 0; partially decomposed hardwood leaves and twigs.

A—0 to 2 inches; brown to dark brown (7.5YR 4/2) very flaggy loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; 40 percent quartzite gravel; few fine mica flakes; very strongly acid; clear smooth boundary.

E—2 to 7 inches; brown (7.5YR 4/4) very flaggy loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; 40 percent quartzite gravel and flagstones; few fine mica flakes; very

strongly acid; clear smooth boundary.

Bt1—7 to 18 inches; yellowish red (5YR 5/6) very flaggy loam; weak fine subangular blocky structure; friable; common fine and medium roots; 40 percent quartzite gravel and flagstones; few distinct clay films on ped faces; common fine mica flakes; very strongly acid; gradual smooth boundary.

Bt2—18 to 38 inches; yellowish red (5YR 5/8) very flaggy sandy clay loam; moderate fine and medium subangular blocky structure; friable, slightly sticky; common fine and medium roots; common distinct clay films on ped faces; 40 percent quartzite gravel and flagstones; common fine mica flakes; common fine and medium pores; strongly acid; clear wavy boundary.

2Bt3—38 to 52 inches; variegated reddish yellow (5YR 6/6) and red (2.5YR 5/8) extremely flaggy sandy clay loam; weak fine subangular blocky structure; friable; 60 percent quartzite flagstones; common distinct clay films on ped faces; common fine roots; many fine mica flakes; strongly acid; clear irregular boundary.

2Cr—52 to 64 inches; partially weathered interbedded quartzite mica schist and quartzite; many fine and medium mica flakes; strongly acid.

2R—64 inches; interbedded quartzite and quartz mica schist.

The solum thickness ranges from 30 to 55 inches. The depth to hard bedrock is greater than 60 inches. The depth to partially weathered bedrock ranges from 40 to 60 inches. The content of rock fragments of quartzite gravel and flagstones is 35 to 70 percent. Stones and boulders cover as much as 15 percent of the soil surface. This soil is very strongly acid or strongly acid.

The A horizon has hue of 7.5YR or 10YR, value of 3 through 7, and chroma of 3 through 6. The A horizon is loam or sandy loam in the fine earth fraction.

The E horizon has hue of 7.5YR or 10YR, value of 5 through 7, and chroma of 3 through 6. The E horizon is loam or sandy loam in the fine earth fraction.

The B horizon has hue of 2.5YR, 5YR, 7.5YR, or 10YR, value of 4 through 6, and chroma of 4 through 8. Parent-material mottles in shades of red, yellow, brown, and white are common in the lower part. The B horizon is loam, sandy clay loam, or clay loam in the fine earth fraction.

Some pedons have a C horizon that is multicolored in shades of red, yellow, brown, and white. The Cr horizon is similar in color to the C horizon and is interbedded quartzite and partially weathered quartz muscovite schist.

The 2R horizon is hard bedrock of interbedded quartzite and quartz muscovite schist.

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(3) United States Department of Agriculture. 1951. Soil survey manual. U.S. Dep. Agric. Handb. 18, 503 pp., illus. [Supplements replacing pp. 173-188 issued May 1962.]

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	more than 9
Very high	more than 12

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

Bedding system. A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on the contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Blowout. A shallow depression from which all or most of the soil material has been removed by wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Broad-base terrace. A ridge-type terrace built to control erosion by diverting runoff along the contour at a nonscouring velocity. The terrace is 10 to 20

inches high and 15 to 30 feet wide and has gently sloping sides, a rounded crown, and a dish-shaped channel along the upper side. It may be nearly level or have a grade toward one or both ends.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Caliche. A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds just beneath the solum, or it is exposed at the surface by erosion.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of a standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Catsteps. Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.

Cement rock. Shaly limestone used in the manufacture of cement.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Compressible (in tables). Excessive decrease in volume of soft soil under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Congeliturbate. Soil material disturbed by frost action.

Conservation tillage. A tillage and planting system in which crop residue covers at least 30 percent of the soil surface after planting. Where soil erosion by wind is the main concern, the system leaves

the equivalent of at least 1,000 pounds per acre of flat small-grain residue on the surface during the critical erosion period.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water

from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Drumlin. A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Esker (geology). A narrow, winding ridge of stratified gravelly and sandy drift deposited by a stream flowing in a tunnel beneath a glacier.

Excess alkali (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Excess lime (in tables). Excess carbonates in the soil that restrict the growth of some plants.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Excess sulfur (in tables). Excessive amount of sulfur in the soil. The sulfur causes extreme acidity if the soil is drained, and the growth of most plants is restricted.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a

stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Fragile (in tables). A soil that is easily damaged by use or disturbance.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate n clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gilgai. Commonly a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of Vertisols—clayey soils having a high coefficient of expansion and contraction with changes in moisture content.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, any plowed or disturbed surface layer.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or

E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) granular, prismatic, or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying horizon. The material of a C horizon may be either like one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, invader plants follow disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame (geology). An irregular, short ridge or hill of stratified glacial drift.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil

passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Muck. Dark colored, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Narrow-base terrace. A terrace no more than 4 to 8 feet wide at the base. A narrow-base terrace is similar to a broad-base terrace, except for the width of the ridge and channel.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Outwash, glacial. Stratified sand and gravel produced by glaciers and carried, sorted, and deposited by glacial melt water.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material).

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permafrost. Layers of soil, or even bedrock, occurring in arctic or subarctic regions, in which a temperature below freezing has existed continuously for a long time.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches

per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Pitting (in tables). Pits caused by melting ground ice. They form on the soil after plant cover is removed.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor filter (in tables). Because of rapid permeability the soil may not adequately filter effluent from a waste disposal system.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor, on the basis of how much the present plant community has departed from the potential.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity and the pH values are expressed as—

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and

not wide enough to be an obstacle to farm mach nery.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Salty water (in tables.) Water that is too salty for consumption by livestock.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saprolite (soil science). Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Sedimentary rock. Rock made up of particles depos ted from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil is generally silty or clayey, is slippery when wet, and is low in productivity.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the

horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Sloughed till. Water-saturated till that has flowed slowly downhill from its original place of deposit by glacial ice. It may rest on other till, on glacial outwash, or on glaciolacustrine deposit.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^{+} to $Ca^{++} + Mg^{++}$. The degrees of sodicity and their respective ratios are—

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0 05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period the the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from about 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons. It

includes all subdivisions of these horizons.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifiying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Till plain. An extensive flat to undulating area underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Too arid (in tables). The soil is dry most of the time, and vegetation is difficult to establish.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Toxicity (in tables). Excessive amount of toxic substances, such as sodium or sulfur, that severely hinder establishment of vegetation or severely restrict plant growth.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial melt water. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer of a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by melt water streams, in glacial lake or other body of still water in front of a glacier.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1953-78 at Manassas, Va.)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January	44.7	25.2	35.0	72.0	0.0	46	2.30	3.10	1.47	5	4.7
February	46.8	26.9	36.9	72.0	1.0	56	2.35	3.02	1.11	5	12.0
March	56.0	32.8	44.4	82.0	12.0	184	2.99	3.99	1.82	6	5.2
April	68.9	43.4	56.2	90.0	24.0	428	2.88	4.02	1.37	6	0.3
May	76.8	52.2	64.5	93.0	32.0	718	3.57	5.14	2.20	6	0
June	84.9	61.1	73.0	98.0	42.0	925	3.43	5.05	1.91	5	0
July	88.5	65.2	76.9	99.0	52.0	1,074	3.42	4.79	1.67	6	0
August	88.3	64.6	76.5	98.0	48.0	1,046	3.64	4.24	1.83	6	0
September	81.8	56.8	69.3	96.0	35.0	824	3.27	4.51	1.50	4	0
October	69.5	44.2	56.9	87.0	24.0	488	2.83	3.56	1.86	4	0
November	58.9	36.2	47.6	77.0	15.0	212	2.56	4.60	1.04	5	2.4
December	47.6	28.7	38.2	73.0	4.0	68	3.01	4.24	1.44	5	6.5
Yearly:											
Average	68.9	45.7	57.3	---	---	---	---	---	---	---	---
Extreme	---	---	---	104	-2	---	---	---	---	---	---
Total	---	---	---	---	---	6,068	36.25	50.26	19.22	63	31.6

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1951-81 at Manassas, Va.)

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 31	Apr. 31	May 8
2 years in 10 later than--	Apr. 9	Apr. 20	Apr. 31
5 years in 10 later than--	Mar. 9	Apr. 4	Apr. 17
First freezing temperature in fall:			
1 year in 10 earlier than--	Sept. 31	Sept. 31	Sept. 31
2 years in 10 earlier than--	Oct. 21	Oct. 21	Oct. 6
5 years in 10 earlier than--	Nov. 11	Nov. 4	Oct. 18

TABLE 3.--GROWING SEASON

(Recorded in the period 1951-81 at Manassas, Va.)

Probability	Daily minimum temperature during growing season		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	205	182	165
8 years in 10	216	199	168
5 years in 10	250	215	191
2 years in 10	275	250	211
1 year in 10	280	278	220

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1A	Aden silt loam, 0 to 2 percent slopes	1,270	0.6
2B	Airmont-Weverton complex, 2 to 7 percent slopes	650	0.3
2C	Airmont-Weverton complex, 7 to 15 percent slopes	1,300	0.6
2D	Airmont-Weverton complex, 15 to 25 percent slopes	970	0.5
2E	Airmont-Weverton complex, 25 to 50 percent slopes	1,420	0.7
3A	Albano silt loam, 0 to 4 percent slopes	4,050	2.0
4B	Arcola silt loam, 2 to 7 percent slopes	16,006	7.9
5C	Arcola-Nestoria complex, 7 to 15 percent slopes	10,610	5.3
5D	Arcola-Nestoria complex, 15 to 25 percent slopes	2,720	1.4
6A	Baile loam, 0 to 4 percent slopes	2,735	1.4
7A	Bermudian silt loam, 0 to 2 percent slopes	2,310	1.1
8C	Braddock loam, 7 to 15 percent slopes	960	0.5
9B	Brentsville sandy loam, 2 to 7 percent slopes	355	0.2
9C	Brentsville sandy loam, 7 to 15 percent slopes	900	0.4
10B	Buckhall loam, 2 to 7 percent slope	2,270	1.1
10C	Buckhall loam, 7 to 15 percent slopes	8,500	4.2
11B	Calverton silt loam, 0 to 7 percent slopes	2,030	1.0
12D	Catlett gravelly silt loam, 15 to 25 percent slopes	460	0.2
13B	Catlett-Sycoline complex, 2 to 7 percent slopes	2,200	1.1
13C	Catlett-Sycoline complex, 7 to 15 percent slopes	2,160	1.1
14A	Codorus loam, 0 to 2 percent slopes	990	0.5
15A	Comus loam, 0 to 2 percent slopes	1,275	0.6
16A	Delanco fine sandy loam, 0 to 4 percent slopes	2,590	1.3
17A	Dulles silt loam, 0 to 4 percent slopes	4,950	2.5
18C	Dumfries sandy loam, 7 to 15 percent slopes	920	0.5
18D	Dumfries sandy loam, 15 to 25 percent slopes	2,000	1.0
18E	Dumfries sandy loam, 25 to 50 percent slopes	3,800	1.9
19B	Elioak loam, 2 to 7 percent slopes	875	0.4
19C	Elioak loam, 7 to 15 percent slopes	1,000	0.5
20B	Elsinboro sandy loam, 2 to 7 percent slopes	1,450	0.7
21B	Fairfax loam, 2 to 7 percent slopes	4,120	2.0
21C	Fairfax loam, 7 to 15 percent slopes	1,470	0.7
22A	Featherstone silt loam, 0 to 1 percent slopes	905	0.5
23C	Gaila sandy loam, 7 to 15 percent slopes	1,590	0.8
23D	Gaila sandy loam, 15 to 25 percent slopes	2,300	1.1
23E	Gaila sandy loam, 25 to 50 percent slopes	2,120	1.1
24B	Glenelg-Buckhall complex, 2 to 7 percent slopes	1,500	0.7
24C	Glenelg-Buckhall complex, 7 to 15 percent slopes	5,000	2.5
24D	Glenelg-Buckhall complex, 15 to 25 percent slopes	1,400	0.7
25A	Glenville loam, 0 to 4 percent slopes	675	0.3
26A	Hatboro silt loam, 0 to 2 percent slopes	605	0.3
27A	Hatboro-Codorus complex, 0 to 2 percent slopes	4,100	2.0
28B	Haymarket silt loam, 2 to 7 percent slopes	520	0.3
28C	Haymarket silt loam, 7 to 15 percent slopes	425	0.2
29B	Hoadly loam, 2 to 7 percent slopes	3,320	1.6
30B	Jackland silt loam, 2 to 7 percent slopes	3,750	1.9
31B	Jackland-Haymarket complex, 2 to 7 percent slopes	1,610	0.8
31C	Jackland-Haymarket complex, 7 to 15 percent slopes	1,300	0.6
32A	Kelly silt loam, 0 to 2 percent slopes	790	0.4
33B	Legore-Oakhill complex, 2 to 7 percent slopes	1,290	0.6
33C	Legore-Oakhill complex, 7 to 15 percent slopes	1,515	0.8
33D	Legore-Oakhill complex, 15 to 25 percent slopes	455	0.2
34B	Lunt loam, 2 to 7 percent slopes	900	0.5
34C	Lunt loam, 7 to 15 percent slopes	1,980	1.0
34D	Lunt loam, 15 to 25 percent slopes	1,030	0.5
35B	Manassas silt loam, 2 to 7 percent slopes	7,295	3.6
36D	Marr very fine sandy loam, 7 to 25 percent slopes	515	0.3
36E	Marr very fine sandy loam, 25 to 50 percent slopes	800	0.4
37A	Marumsco loam, 0 to 4 percent slopes	500	0.2
38B	Meadowville loam, 0 to 5 percent slopes	6,620	3.3
39B3	Minnieville clay loam, 2 to 7 percent slopes, severely eroded	295	0.1
39C3	Minnieville clay loam, 7 to 15 percent slopes, severely eroded	750	0.4
40B	Montalto silty clay loam, 2 to 7 percent slopes	865	0.4
40C	Montalto silty clay loam, 7 to 15 percent slopes	440	0.2
41B	Neabsco loam, 0 to 7 percent slopes	4,155	2.1

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
41C	Neabsco loam, 7 to 15 percent slopes	1,235	0.6
42B	Neabsco-Quantico complex, 2 to 7 percent slopes	1,880	0.9
43D	Nestoria gravelly silt loam, 7 to 25 percent slopes	300	0.1
43E	Nestoria gravelly silt loam, 25 to 50 percent slopes	770	0.4
44D	Occoquan sandy loam, 7 to 25 percent slopes	4,600	2.3
44E	Occoquan sandy loam, 25 to 50 percent slopes	2,290	1.1
45C	Orenda loam, 7 to 15 percent slopes	965	0.5
46B	Panorama silt loam, 2 to 7 percent slopes	5,700	2.8
46C	Panorama silt loam, 7 to 15 percent slopes	1,110	0.5
47B	Quantico sandy loam, 2 to 7 percent slopes	2,540	1.3
47C	Quantico sandy loam, 7 to 15 percent slopes	2,915	1.4
47D	Quantico sandy loam, 15 to 25 percent slopes	1,600	0.8
48A	Reaville silt loam, 0 to 4 percent slopes	1,850	0.9
49A	Rowland silt loam, 0 to 2 percent slopes	1,560	0.8
50D	Spriggs silt loam, 15 to 25 percent slopes	980	0.5
50E	Spriggs silt loam, 25 to 50 percent slopes	710	0.4
51D	Stumptown very flaggy loam, 7 to 25 percent slopes	920	0.5
51E	Stumptown very flaggy loam, 25 to 50 percent slopes	1,080	0.5
52B	Sudley-Oatlands complex, 2 to 7 percent slopes	1,715	0.8
52C	Sudley-Oatlands complex, 7 to 15 percent slopes	2,140	1.1
53B	Sycoline-Kelly complex, 2 to 7 percent slopes	3,180	1.6
53C	Sycoline-Kelly complex, 7 to 15 percent slopes	255	0.1
54B	Urban land-Udorthents complex, 0 to 7 percent slopes	3,750	1.9
55D	Watt channery silt loam, 15 to 25 percent slopes	290	0.1
55E	Watt channery silt loam, 25 to 50 percent slopes	620	0.3
56A	Waxpool silt loam, 0 to 2 percent slopes	5,280	2.6
	Water	1,285	0.6
	Total	202,151	100.0

TABLE 5.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
4B	Arcola silt loam, 2 to 7 percent slopes
7A	Bermudian silt loam, 0 to 2 percent slopes
10B	Buckhall loam, 2 to 7 percent slope
17A	Dulles silt loam, 0 to 4 percent slopes
19B	Elioak loam, 2 to 7 percent slopes
20B	Elsinboro sandy loam, 2 to 7 percent slopes
21B	Fairfax loam, 2 to 7 percent slopes
24B	Glenelg-Buckhall complex, 2 to 7 percent slopes
25A	Glenville loam, 0 to 4 percent slopes
28B	Haymarket silt loam, 2 to 7 percent slopes
30B	Jackland silt loam, 2 to 7 percent slopes (where drained)
31B	Jackland-Haymarket complex, 2 to 7 percent slopes (where drained)
33B	Legore-Oakhill complex, 2 to 7 percent slopes
34B	Lunt loam, 2 to 7 percent slopes
35B	Manassas silt loam, 2 to 7 percent slopes
37A	Marumsco loam, 0 to 4 percent slopes
38B	Meadowville loam, 0 to 5 percent slopes
40B	Montalto silty clay loam, 2 to 7 percent slopes
46B	Panorama silt loam, 2 to 7 percent slopes
47B	Quantico sandy loam, 2 to 7 percent slopes
52B	Sudley-Oatlands complex, 2 to 7 percent slopes
53B	Sycoline-Kelly complex, 2 to 7 percent slopes

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Corn silage	Wheat	Barley	Soybeans	Grass-legume hay	Pasture
		Bu	Tons	Bu	Bu	Bu	Tons	AUM*
1A---------- Aden	IIIw	---	---	---	---	---	4.5	9.0
2B---------- Airmont-Weverton	VIs	---	---	---	---	---	---	---
2C, 2D---------- Airmont-Weverton	VIs	---	---	---	---	---	---	---
2E---------- Airmont-Weverton	VIIs	---	---	---	---	---	---	---
3A---------- Albano	Vw	---	---	---	---	---	3.5	5.8
4B---------- Arcola	IIe	80	18	50	55	30	2.5	5.0
5C---------- Arcola-Nestoria	IVe	---	---	40	50	19	1.9	5.0
5D---------- Arcola-Nestoria	IVe	---	---	---	---	---	1.2	4.0
6A---------- Baile	Vw	---	---	---	---	---	2.0	4.0
7A---------- Bermudian	I	140	28	50	55	45	3.5	8.0
8C---------- Braddock	IIIe	115	23	45	50	35	4.5	8.0
9B---------- Brentsville	IIe	85	17	50	55	40	2.0	4.0
9C---------- Brentsville	IIIe	60	12	45	50	30	1.5	4.0
10B---------- Buckhall	IIe	100	20	45	55	40	5.0	8.0
10C---------- Buckhall	IIIe	90	18	40	50	35	4.8	7.5
11B---------- Calverton	IIIw	85	17	40	50	35	2.5	4.0
12D---------- Catlett	VIe	---	---	---	---	---	1.5	4.0
13B---------- Catlett-Sycoline	IIIe	76	16	35	40	30	2.0	5.0

See footnote at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Wheat	Barley	Soybeans	Grass-legume hay	Pasture
		Bu	Tons	Bu	Bu	Bu	Tons	AUM*
13C---------- Catlett-Sycoline	IVe	65	14	28	25	20	1.8	4.0
14A---------- Codorus	IIw	130	26	45	50	35	3.5	8.0
15A---------- Comus	IIw	140	28	50	55	45	3.5	8.0
16A---------- Delanco	IIw	120	24	45	50	35	3.5	8.0
17A---------- Dulles	IVw	70	14	---	---	---	2.5	4.0
18C---------- Dumfries	IVs	100	20	35	45	35	3.0	4.8
18D---------- Dumfries	VIs	70	14	25	30	25	2.5	4.0
18E---------- Dumfries	VIIe	---	---	---	---	---	---	---
19B---------- Elioak	IIe	135	27	50	55	45	3.5	8.5
19C---------- Elioak	IIIe	125	25	45	50	35	3.5	8.5
20B---------- Elsinboro	IIe	130	26	50	55	45	3.5	8.5
21B---------- Fairfax	IIe	125	25	50	55	35	3.5	8.5
21C---------- Fairfax	IIIe	115	23	45	50	30	3.0	8.0
22A---------- Featherstone	VIIw	---	---	---	---	---	---	---
23C---------- Gaila	IIIe	95	19	40	45	30	2.5	5.5
23D---------- Gaila	IVe	---	---	30	35	25	2.0	5.5
23E---------- Gaila	VIIe	---	---	---	---	---	---	---
24B---------- Glenelg-Buckhall	IIe	120	24	50	55	45	4.2	9.4
24C---------- Glenelg-Buckhall	IIIe	110	22	45	50	40	4.1	8.6

See footnote at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Wheat	Barley	Soybeans	Grass-legume hay	Pasture
		Bu	Tons	Bu	Bu	Bu	Tons	AUM*
24D---------- Glenelg-Buckhall	IVe	88	19	37	40	30	3.5	8.0
25A---------- Glenville	IIw	100	20	40	50	35	3.0	6.5
26A---------- Hatboro	IIIw	115	23	---	---	---	3.5	6.6
27A---------- Hatboro-Codorus	IIIw	121	24	---	---	---	3.5	7.3
28B---------- Haymarket	IIe	80	16	55	65	50	3.0	8.0
28C---------- Haymarket	IIIe	70	14	50	60	45	3.0	7.5
29B---------- Hoadly	IIIw	75	15	50	55	30	2.4	6.0
30B---------- Jackland	IIe	65	13	60	70	50	4.0	8.0
31B---------- Jackland-Haymarket	IIe	71	14	59	69	50	4.0	8.0
31C---------- Jackland-Haymarket	IIIe	65	13	54	64	45	4.0	7.3
32A---------- Kelly	IVw	70	14	40	45	35	2.5	4.0
33B---------- Legore-Oakhill	IIe	---	---	---	---	---	2.9	6.8
33C---------- Legore-Oakhill	IIIe	---	---	---	---	---	2.4	5.6
33D---------- Legore-Oakhill	IVe	---	---	---	---	---	1.9	5.4
34B---------- Lunt	IIe	110	22	60	65	45	3.0	8.3
34C---------- Lunt	IVe	85	17	50	55	40	2.5	6.5
34D---------- Lunt	VIe	---	---	---	---	---	3.0	5.6
35B---------- Manassas	IIe	130	26	50	55	45	3.5	6.0
36D---------- Marr	VIe	---	---	---	---	---	3.0	7.5

See footnote at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Wheat	Barley	Soybeans	Grass-legume hay	Pasture
		Bu	Tons	Bu	Bu	Bu	Tons	AUM*
36E---------- Marr	VIIe	---	---	---	---	---	---	---
37A---------- Marumsco	IIw	110	25	40	50	50	4.5	9.0
38B---------- Meadowville	IIe	125	25	55	65	45	3.8	6.5
39B3---------- Minnieville	IIIe	110	25	45	50	35	3.2	8.3
39C3---------- Minnieville	IVe	80	16	30	35	25	2.8	7.6
40B---------- Montalto	IIe	135	27	50	55	40	3.5	5.5
40C---------- Montalto	IIIe	125	25	45	50	35	3.5	5.5
41B---------- Neabsco	IIe	95	19	45	55	35	3.0	5.5
41C---------- Neabsco	IIIe	90	18	40	45	30	2.5	5.0
42B---------- Neabsco-Quantico	IIw	97	20	47	50	35	3.2	5.7
43D---------- Nestoria	VIe	---	---	---	---	---	0.5	2.0
43E---------- Nestoria	VIIe	---	---	---	---	---	---	---
44D---------- Occoquan	VIe	---	---	---	---	---	1.0	3.0
44E---------- Occoquan	VIIe	---	---	---	---	---	---	---
45C---------- Orenda	IIIe	130	26	50	55	40	3.6	8.7
46B---------- Panorama	IIe	100	20	50	55	40	2.5	4.0
46C---------- Panorama	IIIe	75	15	45	50	35	2.0	4.0
47B---------- Quantico	IIe	100	20	50	55	35	3.5	6.0
47C---------- Quantico	IIIe	80	16	40	45	30	3.0	5.5
47D---------- Quantico	IVe	---	---	---	---	---	2.5	4.0

See footnote at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Wheat	Barley	Soybeans	Grass-legume hay	Pasture
		Bu	Tons	Bu	Bu	Bu	Tons	AUM*
48A---------- Reaville	IIIw	75	15	45	50	35	2.5	5.0
49A---------- Rowland	IIw	130	26	45	55	40	3.5	8.5
50D, 50E---------- Spriggs	VIIe	---	---	---	---	---	---	3.7
51D---------- Stumptown	VIs	---	---	---	---	---	---	4.0
51E---------- Stumptown	VIIe	---	---	---	---	---	---	---
52B---------- Sudley-Oatlands	IIs	133	24	57	60	45	3.2	9.5
52C---------- Sudley-Oatlands	IIIe	111	22	46	50	40	3.0	8.5
53B---------- Sycoline-Kelly	IVw	81	16	40	50	35	2.3	5.5
53C---------- Sycoline-Kelly	IVw	70	14	40	45	35	3.0	8.5
54B. Urban land-Udorthents								
55D---------- Watt	VIe	---	---	---	---	---	---	4.0
55E---------- Watt	VIe	---	---	---	---	---	---	---
56A---------- Waxpool	IVw	75	15	25	35	25	2	6

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
1A---------- Aden	6W	Slight	Moderate	Moderate	Severe	Sweetgum----------	80	6	Yellow-poplar.
						White oak----------	70	4	
						Shortleaf pine------	70	8	
						Yellow-poplar-------	80	5	
2B**, 2C**: Airmont--------	4A	Slight	Moderate	Moderate	Slight	Northern red oak----	70	4	Eastern white pine.
						Yellow-poplar-------	85	6	
						Eastern white pine--	80	10	
						Virginia pine-------	70	8	
Weverton-------	4A	Slight	Slight	Moderate	Slight	Northern red oak----	70	4	Eastern white pine.
						Chestnut oak--------	70	4	
						Virginia pine-------	70	8	
2D**: Airmont-------- (North aspect)	4A	Slight	Moderate	Moderate	Slight	Northern red oak----	70	4	Eastern white pine.
						Yellow poplar-------	85	6	
						Eastern white pine--	80	10	
						Virginia pine-------	70	8	
Weverton------- (North aspect)	4R	Moderate	Moderate	Moderate	Slight	Northern red oak----	70	4	Eastern white pine.
						Chestnut oak--------	70	4	
						Virginia pine-------	70	8	
2D**: Airmont-------- (South aspect)	3R	Moderate	Moderate	Moderate	Slight	Northern red oak----	60	3	Eastern white pine.
						Virginia pine-------	60	6	
						Shortleaf pine------	60	6	
Weverton------- (South aspect)	3R	Moderate	Moderate	Severe	Slight	Northern red oak----	60	3	Eastern white pine.
						Virginia pine-------	60	3	
						Chestnut oak--------	60	3	
						White oak----------	60	3	
2E**: Airmont-------- (North aspect)	4R	Severe	Severe	Moderate	Slight	Northern red oak----	70	4	Eastern white pine.
						Yellow-poplar-------	85	6	
						Eastern white pine--	80	10	
						Virginia pine-------	70	8	
Weverton------- (North aspect)	4R	Severe	Severe	Moderate	Slight	Northern red oak----	70	4	Eastern white pine.
						Chestnut oak--------	70	4	
						Virginia pine-------	70	8	
2E**: Airmont-------- (South aspect)	3R	Severe	Severe	Moderate	Slight	Northern red oak----	60	3	Eastern white pine.
						Virginia pine-------	60	6	
						Shortleaf pine------	60	6	
Weverton------- (South aspect)	3R	Severe	Severe	Severe	Slight	Northern red oak----	60	3	Eastern white pine.
						Virginia pine-------	60	3	
						Chestnut oak--------	60	3	
						White oak----------	60	3	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
3A Albano	3W	Slight	Moderate	Severe	Severe	Northern red oak Virginia pine	60 60	3 6	Loblolly pine.
4B Arcola	3A	Slight	Slight	Slight	Slight	Northern red oak Virginia pine White oak	67 69 67	3 8 3	Eastern white pine, yellow-poplar.
5C**: Arcola	3A	Slight	Slight	Slight	Slight	Northern red oak Virginia pine White oak	67 69 67	3 8 3	Eastern white pine, yellow-poplar.
Nestoria	3D	Slight	Slight	Moderate	Slight	Northern red oak Virginia pine White oak	60 60 60	3 6 3	Eastern white pine, Scotch pine.
5D**: Arcola (North aspect)	3R	Moderate	Moderate	Slight	Slight	Northern red oak Virginia pine White oak	67 69 67	3 8 3	Eastern white pine, yellow-poplar.
Nestoria (North aspect)	3D	Slight	Moderate	Moderate	Slight	Northern red oak Virginia pine White oak	60 60 60	3 6 3	Eastern white pine, Scotch pine.
5D**: Arcola (South aspect)	3R	Moderate	Moderate	Slight	Slight	Northern red oak Virginia pine White oak	57 59 57	3 6 3	Eastern white pine.
Nestoria (South aspect)	2D	Slight	Moderate	Severe	Slight	Northern red oak Virginia pine	50 50	2 5	Eastern white pine, Scotch pine.
6A Baile	4W	Slight	Severe	Severe	Slight	Pin oak	85+	4	Eastern white pine, Norway spruce, white spruce.
7A Burmudian	4A	Slight	Slight	Slight	Slight	Northern red oak Yellow-poplar Sweetgum	85 95 95	4 7 8	Eastern white pine, yellow-poplar, black walnut.
8C Braddock	4C	Slight	Moderate	Slight	Slight	Northern red oak Yellow-poplar Eastern white pine Virginia pine Shortleaf pine	80 90 95 76 76	4 6 12 8 8	Yellow-poplar, eastern white pine.
9B, 9C Brentsville	3A	Slight	Slight	Slight	Slight	Northern red oak Virginia pine White oak	67 69 67	3 8 3	Eastern white pine, Scotch pine.
10B, 10C Buckhall	4A	Slight	Slight	Slight	Slight	Northern red oak Yellow-poplar Loblolly pine Virginia pine White oak	70 85 80 70 70	4 6 8 8 4	Eastern white pine.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
11B Calverton	4W	Slight	Moderate	Moderate	Moderate	Northern red oak Shortleaf pine Virginia pine	70 70 70	4 8 8	Loblolly pine, eastern white pine.
12D Catlett (North aspect)	7D	Moderate	Moderate	Moderate	Severe	Virginia pine Shortleaf pine Northern red oak	62 58 60	7 6 3	Loblolly pine, eastern white pine.
12D Catlett (South aspect)	5D	Moderate	Moderate	Moderate	Severe	Virginia pine Shortleaf pine Northern red oak	52 48 50	5 4 2	Loblolly pine, eastern white pine.
13B**: Catlett	7D	Slight	Slight	Moderate	Severe	Virginia pine Shortleaf pine Northern red oak	62 58 60	7 6 3	Loblolly pine, Virginia pine, eastern white pine.
Sycoline	3W	Slight	Slight	Slight	Moderate	Northern red oak Virginia pine	65 55	3 6	Eastern white pine, Scotch pine.
13C**: Catlett	7D	Slight	Slight	Moderate	Severe	Virginia pine Shortleaf pine Northern red oak	62 58 60	7 6 3	Loblolly pine, Virginia pine, eastern white pine.
Sycoline	3W	Slight	Slight	Slight	Moderate	Northern red oak Virginia pine	65 55	3 6	Eastern white pine, Scotch pine.
14A Codorus	4W	Slight	Moderate	Slight	Slight	Northern red oak White ash Sugar maple Yellow-poplar Eastern white pine	90 90 90 100 100	4 4 4 8 10	Yellow-poplar, black walnut, eastern white pine.
15A Comus	4A	Slight	Slight	Slight	Slight	Northern red oak Yellow-poplar	85 95	4 7	Eastern white pine, black walnut, yellow-poplar.
16A Delanco	4W	Slight	Moderate	Slight	Slight	Black oak Yellow-poplar	80 90	4 6	Eastern white pine, yellow-poplar.
17A Dulles	3W	Slight	Severe	Moderate	Moderate	Northern red oak Virginia pine Shortleaf pine	60 60 60	3 6 6	Virginia pine, loblolly pine.
18C Dumfries	4A	Slight	Slight	Slight	Slight	White oak Yellow-poplar Loblolly pine Virginia pine	76 86 86 76	4 6 9 8	Loblolly pine, yellow-poplar, eastern white pine.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
18D---------- Dumfries (North aspect)	4R	Moderate	Moderate	Slight	Slight	White oak----------	76	4	Loblolly pine, yellow-poplar, eastern white pine.
						Yellow-poplar-------	86	6	
						Loblolly pine-------	86	9	
						Virginia pine-------	76	8	
18D---------- Dumfries (South aspect)	4R	Moderate	Moderate	Moderate	Slight	White oak----------	70	4	Loblolly pine, eastern white pine.
						Yellow-poplar-------	80	5	
						Loblolly pine-------	80	8	
						Virginia pine-------	70	8	
18E---------- Dumfries (North aspect)	4R	Severe	Severe	Slight	Slight	White oak----------	76	4	Loblolly pine, yellow-poplar, eastern white pine.
						Yellow-poplar-------	86	6	
						Loblolly pine-------	86	9	
						Virginia pine-------	76	8	
18E---------- Dumfries (South aspect)	4R	Severe	Severe	Moderate	Slight	White oak----------	70	4	Loblolly pine, eastern white pine.
						Yellow-poplar-------	80	5	
						Loblolly pine-------	80	8	
						Virginia pine-------	70	8	
19B, 19C-------- Elioak	4C	Slight	Moderate	Slight	Slight	Black oak----------	80	4	Loblolly pine, yellow-poplar, eastern white pine.
						Yellow-poplar-------	90	6	
						Virginia pine-------	75	8	
						Shortleaf pine------	70	8	
20B---------- Elsinboro	4A	Slight	Slight	Slight	Slight	Black oak----------	80	4	Eastern white pine, yellow-poplar, loblolly pine.
						Yellow-poplar-------	90	6	
						Virginia pine-------	80	8	
21B, 21C-------- Fairfax	4A	Slight	Slight	Slight	Slight	Northern red oak----	70	4	Loblolly pine, eastern white pine.
						Yellow-poplar-------	80	5	
						Virginia pine-------	70	8	
						Shortleaf pine------	70	8	
22A---------- Featherstone	4W	Slight	Severe	Severe	Severe	Sweetgum-----------	75	5	Sweetgum.
23C---------- Gaila	4A	Slight	Slight	Slight	Slight	Northern red oak----	70	4	Eastern white pine, shortleaf pine, loblolly pine, yellow-poplar.
						Yellow-poplar-------	80	8	
						Virginia pine-------	80	8	
						Shortleaf pine------	80	9	
23D---------- Gaila (North aspect)	4R	Moderate	Moderate	Slight	Slight	Northern red oak----	70	4	Eastern white pine, shortleaf pine, loblolly pine, yellow-poplar.
						Yellow-poplar-------	80	8	
						Virginia pine-------	80	8	
						Shortleaf pine------	80	9	
23D---------- Gaila (South aspect)	3R	Moderate	Moderate	Moderate	Slight	Northern red oak----	60	3	Eastern white pine, shortleaf pine.
						Yellow poplar-------	80	5	
						Virginia pine-------	70	8	
						Shortleaf pine------	70	8	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
24B**, 24C**:									
Glenelg	4A	Slight	Slight	Slight	Slight	Black oak	78	4	Eastern white pine, black walnut, loblolly pine, yellow-poplar.
						Yellow-poplar	87	6	
						Virginia pine	70	8	
						Shortleaf pine	70	8	
Buckhall	4A	Slight	Slight	Slight	Slight	Northern red oak	70	4	Eastern white pine.
						Yellow-poplar	85	6	
						Loblolly pine	80	8	
						Virginia pine	70	8	
						White oak	70	4	
24D**:									
Glenelg (North aspect)	4R	Moderate	Moderate	Slight	Slight	Black oak	78	4	Eastern white pine, loblolly pine.
						Yellow-poplar	87	6	
						Virginia pine	70	8	
						Shortleaf pine	70	8	
Buckhall (North aspect)	4R	Moderate	Severe	Slight	Slight	Northern red oak	70	4	Eastern white pine.
						Yellow-poplar	85	6	
						Loblolly pine	80	8	
						Virginia pine	70	8	
						White oak	70	4	
24D**:									
Glenelg (South aspect)	4R	Moderate	Moderate	Slight	Slight	Black oak	78	4	Eastern white pine, loblolly pine.
						Yellow-poplar	87	6	
						Virginia pine	70	8	
						Shortleaf pine	70	8	
Buckhall (South aspect)	3R	Moderate	Severe	Slight	Slight	Northern red oak	60	3	Eastern white pine.
						Loblolly pine	70	6	
						Virginia pine	60	6	
						White oak	60	3	
25A Glenville	4W	Slight	Moderate	Moderate	Moderate	Northern red oak	80	4	Yellow-poplar, eastern white pine, Norway spruce.
						White ash	80	4	
						Sugar maple	80	4	
						Yellow-poplar	90	6	
26A Hatboro	3W	Slight	Severe	Slight	Moderate	Red maple	60	3	Eastern white pine, white spruce.
						American sycamore	60	---	
						Pin oak	60	3	
27A Hatboro	3W	Slight	Severe	Slight	Moderate	Red maple	60	3	Eastern white pine, white spruce.
						Pin oak	60	3	
Codorus	4W	Slight	Moderate	Slight	Slight	Northern red oak	90	4	Yellow-poplar, black walnut, white ash, sugar maple, eastern white pine.
						White ash	90	4	
						Sugar maple	90	4	
						Yellow-poplar	100	8	
						Eastern white pine	100	10	
						Black walnut	100	---	
28B, 28C Haymarket	4A	Slight	Slight	Slight	Slight	Northern red oak	80	8	Eastern white pine.
						Loblolly pine	85	6	
						Yellow-poplar	70	4	
						Virginia pine	70	8	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
29B---------- Hoadly	4W	Slight	Moderate	Moderate	Moderate	Northern red oak----	70	4	Eastern white pine, yellow-poplar.
						Yellow-poplar-------	85	6	
						Eastern white pine--	80	10	
30B---------- Jackland	6C	Slight	Moderate	Moderate	Moderate	Northern red oak----	60	3	Eastern white pine.
						Loblolly pine-------	70	6	
						Yellow-poplar-------	74	4	
						Virginia pine-------	60	6	
31B**, 31C**:									
Jackland-------	6C	Slight	Moderate	Moderate	Moderate	Northern red oak----	60	3	Eastern white pine.
						Loblolly pine-------	70	6	
						Yellow-poplar-------	74	4	
						Virginia pine-------	60	6	
Haymarket------	4A	Slight	Slight	Slight	Slight	Northern red oak----	80	8	Eastern white pine.
						Loblolly pine-------	85	6	
						Yellow-poplar-------	70	4	
						Virginia pine-------	70	8	
32A---------- Kelly	3W	Slight	Moderate	Moderate	Moderate	Northern red oak----	60	3	Virginia pine, loblolly pine,
						Virginia pine-------	60	6	
						Shortleaf pine------	60	6	
33B**:									
Legore---------	4A	Slight	Slight	Slight	Slight	Black oak-----------	75	4	Yellow-poplar, loblolly pine, eastern white pine.
						Yellow-poplar-------	85	6	
						Virginia pine-------	75	8	
						Shortleaf pine------	75	8	
Oakhill--------	4A	Slight	Slight	Moderate	Moderate	Northern red oak----	70	4	Eastern white pine.
						Yellow-poplar-------	80	5	
						Eastern white pine--	80	10	
						Virginia pine-------	70	8	
33C**:									
Legore---------	4A	Slight	Slight	Slight	Slight	Black oak-----------	75	4	Yellow-poplar, loblolly pine, eastern white pine.
						Yellow-poplar-------	85	6	
						Virginia pine-------	75	8	
						Shortleaf pine------	75	8	
Oakhill--------	4A	Slight	Slight	Moderate	Moderate	Northern red oak----	70	4	Eastern white pine.
						Yellow-poplar-------	80	5	
						Eastern white pine--	80	10	
						Virginia pine-------	70	8	
33D**:									
Legore--------- (North aspect)	4R	Moderate	Moderate	Slight	Slight	Black oak-----------	75	4	Yellow-poplar, Virginia pine, loblolly pine, eastern white pine.
						Yellow-poplar-------	85	6	
						Virginia pine-------	75	8	
						Shortleaf pine------	75	8	
Oakhill.									
33D**:									
Legore--------- (South aspect)	3R	Moderate	Moderate	Moderate	Slight	Black oak-----------	65	3	Eastern white pine, loblolly pine.
						Yellow-poplar-------	75	4	
						Virginia pine-------	65	7	
						Shortleaf pine------	65	7	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
33D**: Oakhill.									
34B, 34C---------- Lunt	8A	Slight	Moderate	Slight	Slight	Loblolly pine------- Yellow-poplar------- Northern red oak---- Virginia pine------- Eastern white pine--	80 85 75 70 80	8 6 4 8 10	Loblolly pine, eastern white pine.
34D---------- Lunt (North aspect)	8R	Moderate	Moderate	Slight	Slight	Loblolly pine------- Yellow-poplar------- Northern red oak---- Virginia pine------- Eastern white pine--	80 85 75 70 80	8 6 4 8 10	Loblolly pine, eastern white pine.
34D---------- Lunt (South aspect)	6R	Moderate	Moderate	Slight	Slight	Loblolly pine------- Yellow-poplar------- Northern red oak---- Virginia pine-------	70 75 65 60	6 4 3 6	Loblolly pine.
35B---------- Manassas	8A	Slight	Moderate	Slight	Slight	Virginia pine------- Northern red oak---- Shortleaf pine------ Yellow-poplar-------	76 80 80 90	8 4 9 6	Loblolly pine, yellow-poplar, eastern white pine.
36D---------- Marr	8R	Moderate	Moderate	Slight	Slight	Loblolly pine------- Yellow-poplar------- White oak---------- Virginia pine------- Sweetgum----------	80 80 70 70 80	8 5 4 8 6	Loblolly pine, eastern white pine, yellow-poplar.
36E---------- Marr	8R	Severe	Severe	Slight	Slight	Loblolly pine------- Yellow-poplar------- White oak---------- Virginia pine------- Sweetgum----------	80 80 70 70 80	8 5 4 8 6	Loblolly pine, eastern white pine, yellow-poplar.
37A---------- Marumsco	4A	Slight	Moderate	Slight	Moderate	Northern red oak---- Yellow-poplar------- American beech------ Sweetgum---------- Red maple---------- Shortleaf pine------ Virginia pine-------	87 80 80 90 80 80 80	4 4 4 7 4 9 8	Eastern white pine, yellow-poplar, loblolly pine.
38B---------- Meadowville	4A	Slight	Slight	Slight	Slight	Northern red oak---- Yellow-poplar------- Virginia pine------- Loblolly pine-------	76 90 80 90	4 6 8 9	Loblolly pine, eastern white pine, yellow-poplar, black walnut.
39B3, 39C3------ Minnieville	4C	Slight	Moderate	Moderate	Slight	Northern red oak---- Shortleaf pine------ Virginia pine------- Yellow-poplar-------	70 70 80 70	8 8 5 4	Eastern white pine, yellow-poplar.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
40B, 40C-------- Maltalto	4C	Slight	Moderate	Slight	Slight	Black oak---------- Yellow-poplar------- Virginia pine------- Shortleaf pine------ Eastern white pine--	76 90 75 75 90	4 6 8 8 12	Eastern white pine, yellow-poplar, black walnut, loblolly pine.
41B, 41C-------- Neabsco	3W	Slight	Moderate	Moderate	Moderate	Northern red oak---- Black oak---------- Virginia pine------- Red maple---------- Yellow-poplar-------	66 66 67 60 80	3 3 7 3 5	Yellow-poplar, eastern white pine.
42B**: Neabsco--------	3W	Slight	Moderate	Moderate	Moderate	Northern red oak---- Black oak---------- Virginia pine------- Red maple---------- Yellow-poplar-------	66 66 67 60 80	3 3 7 3 5	Yellow-poplar, eastern white pine, hemlock.
Quantico--------	4A	Slight	Slight	Slight	Slight	Northern red oak---- Yellow-poplar------- Virginia pine------- Sweetgum----------	70 85 70 80	4 6 8 6	Loblolly pine, yellow-poplar, shortleaf pine, eastern white pine.
43D---------- Nestoria (North aspect)	3D	Slight	Moderate	Moderate	Moderate	Northern red oak---- Virginia pine------- White oak----------	60 60 60	3 6 3	Eastern white pine, Scotch pine.
43D---------- Nestoria (South aspect)	2D	Slight	Moderate	Severe	Moderate	Northern red oak---- Virginia pine-------	50 50	2 5	Eastern white pine, Scotch pine.
43E---------- Nestoria (North aspect)	3R	Moderate	Severe	Moderate	Moderate	Northern red oak---- Virginia pine------- White oak----------	60 60 60	3 6 3	Eastern white pine, Scotch pine.
43E---------- Nestoria (South aspect)	2R	Moderate	Severe	Severe	Moderate	Northern red oak---- Virginia pine-------	50 50	2 5	Eastern white pine, Scotch pine.
44D---------- Occoquan (North aspect)	3R	Moderate	Moderate	Moderate	Slight	Northern red oak---- Virginia pine------- White oak---------- Yellow-poplar-------	62 60 60 70	3 3 6 4	Eastern white pine, yellow-poplar.
44D---------- Occoquan (South aspect)	2R	Moderate	Moderate	Severe	Slight	White oak---------- Chestnut oak--------	50 46	2 2	Virginia pine, shortleaf pine.
44E---------- Occoquan (North aspect)	3R	Severe	Severe	Moderate	Slight	Northern red oak---- Virginia pine------- White oak---------- Yellow-poplar-------	62 60 60 70	3 3 6 4	Eastern white pine, yellow-poplar.
44E---------- Occoquan (South aspect)	2R	Severe	Severe	Severe	Slight	White oak---------- Chestnut oak--------	50 46	2 2	Virginia pine, shortleaf pine.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
45C---------- Orenda	4C	Slight	Moderate	Moderate	Slight	Northern red oak----	70	4	Eastern white pine, yellow-poplar.
						Virginia pine-------	74	8	
						Shortleaf pine------	63	7	
46B, 46C-------- Panorama	4A	Slight	Slight	Slight	Slight	Northern red oak----	68	3	Eastern white pine, Scotch pine.
						Virginia pine-------	70	8	
47B, 47C-------- Quantico	4A	Slight	Slight	Slight	Slight	Northern red oak----	70	4	Loblolly pine, yellow-poplar, shortleaf pine, eastern white pine.
						Yellow-poplar-------	85	6	
						Virginia pine-------	70	8	
						Sweetgum------------	80	6	
47D---------- Quantico (North aspect)	4R	Moderate	Moderate	Slight	Slight	Northern red oak----	70	4	Loblolly pine, yellow-poplar, shortleaf pine, eastern white pine.
						Yellow-poplar-------	85	6	
						Virginia pine-------	70	8	
						Sweetgum------------	80	6	
47D---------- Quantico (South aspect)	3R	Moderate	Moderate	Moderate	Slight	Northern red oak----	60	3	Loblolly pine, shortleaf pine, eastern white pine.
						Virginia pine-------	75	8	
48A---------- Reaville	4W	Slight	Moderate	Slight	Moderate	Northern red oak----	80	4	Eastern white pine.
						Virginia pine-------	75	8	
49A---------- Rowland	4W	Slight	Moderate	Slight	Slight	Northern red oak----	80	4	Eastern white pine, yellow-poplar, loblolly pine.
						Yellow-poplar-------	95	7	
50D---------- Spriggs (North aspect)	3R	Moderate	Moderate	Slight	Moderate	Northern red oak----	60	6	Eastern white pine, loblolly pine, yellow-poplar.
						Shortleaf pine------	65	7	
						Virginia pine-------	60	3	
50D---------- Spriggs (South aspect)	2R	Moderate	Moderate	Moderate	Moderate	Shortleaf pine------	50	5	Virginia pine, loblolly pine.
						Virginia pine-------	55	6	
50E---------- Spriggs (North aspect)	3R	Severe	Severe	Slight	Moderate	Northern red oak----	60	6	Eastern white pine, loblolly pine, yellow-poplar.
						Shortleaf pine------	65	7	
						Virginia pine-------	60	3	
50E---------- Spriggs (South aspect)	2R	Severe	Severe	Moderate	Moderate	Shortleaf pine------	50	5	Virginia pine, loblolly pine.
						Virginia pine-------	55	6	
51D---------- Stumptown (North aspect)	3R	Slight	Moderate	Moderate	Moderate	Chestnut oak--------	65	3	Eastern white pine, loblolly pine.
						Virginia pine-------	70	8	
						Chestnut oak--------	70	4	
						Red maple-----------	70	3	
51D---------- Stumptown (South aspect)	3R	Slight	Moderate	Severe	Moderate	Chestnut oak--------	55	3	Eastern white pine, loblolly pine.
						Virginia pine-------	55	6	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
51E---------- Stumptown (North aspect)	3R	Moderate	Severe	Moderate	Moderate	Chestnut oak--------	65	3	Eastern white pine, loblolly pine.
						Virginia pine-------	70	8	
						Chestnut oak--------	70	4	
						Red maple----------	70	3	
51E---------- Stumptown (South aspect)	3R	Moderate	Severe	Severe	Moderate	Chestnut oak--------	55	3	Eastern white pine, loblolly pine.
						Virginia pine-------	55	6	
52B**, 52C**: Sudley---------	4A	Slight	Slight	Slight	Slight	Northern red oak----	75	4	Eastern white pine.
						Yellow-poplar-------	90	6	
						Virginia pine-------	75	8	
						White oak----------	75	4	
Oatlands-------	4A	Slight	Slight	Slight	Moderate	Northern red oak----	70	4	Eastern white pine.
						Yellow-poplar-------	85	6	
						Eastern white pine--	80	10	
						Virginia pine-------	70	8	
53B**, 53C**: Sycoline-------	3W	Slight	Slight	Slight	Moderate	Northern red oak----	65	3	Eastern white pine, Scotch pine.
						Virginia pine-------	55	6	
Kelly----------	3W	Slight	Moderate	Moderate	Moderate	Northern red oak----	60	3	Virginia pine, loblolly pine.
						Virginia pine-------	60	6	
						Shortleaf pine------	60	6	
55D---------- Watt (North aspect)	6R	Moderate	Moderate	Moderate	Moderate	Virginia pine-------	60	6	Virginia pine, loblolly pine.
						Shortleaf pine------	60	6	
						Northern red oak----	60	3	
55D---------- Watt (South aspect)	5R	Moderate	Moderate	Moderate	Moderate	Virginia pine-------	50	5	Virginia pine, loblolly pine.
						Shortleaf pine------	50	5	
55E---------- Watt (North aspect)	6R	Severe	Severe	Moderate	Moderate	Virginia pine-------	60	6	Virginia pine, loblolly pine.
						Shortleaf pine------	60	6	
						Northern red oak----	60	3	
55E---------- Watt (South aspect)	5R	Severe	Severe	Moderate	Moderate	Virginia pine-------	50	5	Virginia pine, loblolly pine.
						Shortleaf pine------	50	5	
56A---------- Waxpool	4W	Slight	Severe	Severe	Severe	Sweetgum-----------	60	4	Sweetgum.
						Red maple----------	50	2	

* Productivity class is the yield in cubic meters per hectare per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
1A Aden	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
2B*: Airmont	Moderate: small stones, wetness.	Moderate: wetness, small stones.	Severe: large stones, small stones.	Moderate: large stones.	Severe: large stones.
Weverton	Severe: large stones.	Severe: large stones.	Severe: large stones, small stones.	Severe: large stones.	Severe: large stones, droughty.
2C*: Airmont	Moderate: slope, small stones, wetness.	Moderate: wetness, small stones.	Severe: large stones, slope, small stones.	Moderate: large stones.	Severe: large stones.
Weverton	Severe: large stones.	Severe: large stones.	Severe: large stones, slope, small stones.	Severe: large stones.	Severe: large stones, droughty.
2D*: Airmont	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Moderate: large stones, slope.	Severe: large stones, slope.
Weverton	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope, small stones.	Severe: large stones.	Severe: large stones, droughty, slope.
2E*: Airmont	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: large stones, slope.
Weverton	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope, small stones.	Severe: large stones, slope.	Severe: large stones, droughty, slope.
3A Albano	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
4B Arcola	Slight	Slight	Moderate: slope, small stones, depth to rock.	Slight	Moderate: depth to rock.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
5C*:					
Arcola	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope, depth to rock.
Nestoria	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones, depth to rock.	Slight	Severe: droughty, depth to rock.
5D*:					
Arcola	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Nestoria	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Moderate: slope.	Severe: depth to rock, slope.
6A Baile	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, erodes easily.	Severe: wetness.
7A Bermudian	Severe: flooding.	Slight	Moderate: flooding.	Severe: erodes easily.	Moderate: flooding.
8C Braddock	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
9B Brentsville	Slight	Slight	Moderate: slope, small stones, depth to rock.	Slight	Moderate: depth to rock.
9C Brentsville	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, depth to rock.
10B Buckhall	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
10C Buckhall	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
11B Calverton	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: percs slowly, wetness.	Moderate: wetness.	Moderate: wetness, droughty.
12D Catlett	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Moderate: slope.	Severe: slope, depth to rock.
13B*:					
Catlett	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Slight	Severe: depth to rock.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
13B*: Sycoline	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Moderate: wetness.	Moderate: wetness, depth to rock.
13C*: Catlett	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Slight	Severe: depth to rock.
Sycoline	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Moderate: wetness, slope, depth to rock.
14A Codorus	Severe: flooding, wetness.	Moderate: wetness, flooding.	Severe: flooding, wetness.	Moderate: wetness.	Severe: flooding.
15A Comus	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
16A Delanco	Severe: flooding, wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
17A Dulles	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
18C Dumfries	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: droughty, slope.
18D Dumfries	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
18E Dumfries	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
19B Elioak	Slight	Slight	Moderate: slope, small stones.	Slight	Moderate: large stones, droughty.
19C Elioak	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: large stones, droughty, slope.
20B Elsinboro	Severe: flooding.	Slight	Moderate: slope, small stones.	Slight	Slight.
21B Fairfax	Slight	Slight	Moderate: slope.	Slight	Slight.
21C Fairfax	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
22A---------- Featherstone	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.
23C---------- Gaila	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
23D---------- Gaila	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
23E---------- Gaila	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
24B*: Glenelg----------	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
Buckhall----------	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
24C*: Glenelg----------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
Buckhall----------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
24D*: Glenelg----------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Buckhall----------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
25A---------- Glenville	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
26A---------- Hatboro	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: flooding, wetness.
27A*: Hatboro----------	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: flooding, wetness.
Codorus----------	Severe: flooding, wetness.	Moderate: wetness, flooding.	Severe: flooding, wetness.	Moderate: wetness.	Severe: flooding.
28B---------- Haymarket	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight----------	Slight.
28C---------- Haymarket	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight----------	Moderate: slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
29B Hoadly	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
30B Jackland	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
31B*: Jackland	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
Haymarket	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight	Slight.
31C*: Jackland	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: slope, wetness, percs slowly.	Moderate: wetness.	Moderate: wetness, slope.
Haymarket	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
32A Kelly	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Moderate: wetness.	Moderate: wetness.
33B*: Legore	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, large stones.
Oakhill	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Severe: droughty.
33C*: Legore	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, large stones, slope.
Oakhill	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Severe: droughty, slope.
33D*: Legore	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Oakhill	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
34B Lunt	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
34C---------- Lunt	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
34D---------- Lunt	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
35B---------- Manassas	Severe: flooding.	Moderate: wetness.	Moderate: slope, wetness, small stones.	Slight----------	Slight.
36D---------- Marr	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
36E---------- Marr	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
37A---------- Marumsco	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
38B---------- Meadowville	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
39B3---------- Minnieville	Slight----------	Slight----------	Moderate: small stones, percs slowly.	Slight----------	Slight.
39C3---------- Minnieville	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
40B---------- Montalto	Moderate: small stones, percs slowly.	Moderate: small stones, percs slowly.	Severe: small stones.	Slight----------	Moderate: small stones.
40C---------- Montalto	Moderate: slope, small stones, percs slowly.	Moderate: slope, small stones, percs slowly.	Severe: slope, small stones.	Slight----------	Moderate: small stones, slope.
41B---------- Neabsco	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
41C---------- Neabsco	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: slope, wetness, percs slowly.	Moderate: wetness.	Moderate: wetness, slope.
42B*: Neabsco----------	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
Quantico----------	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
43D---------- Nestoria	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Moderate: slope.	Severe: depth to rock, slope.
43E---------- Nestoria	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: depth to rock, slope.
44D---------- Occoquan	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
44E---------- Occoquan	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
45C---------- Orenda	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
46B---------- Panorama	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
46C---------- Panorama	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
47B---------- Quantico	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
47C---------- Quantico	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
47D---------- Quantico	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
48A---------- Reaville	Severe: wetness.	Moderate: wetness, percs slowly.	Moderate: wetness, slope, depth to rock.	Severe: erodes easily.	Moderate: wetness, thin layer.
49A---------- Rowland	Severe: flooding, wetness.	Moderate: flooding, wetness, percs slowly.	Severe: wetness, flooding.	Severe: erodes easily.	Severe: flooding.
50D, 50E---------- Spriggs	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
51D---------- Stumptown	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope, small stones.	Severe: large stones.	Severe: large stones, droughty, slope.
51E---------- Stumptown	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope, small stones.	Severe: slope, large stones.	Severe: large stones, droughty, slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
52B*:					
Sudley	Slight	Slight	Moderate: small stones, slope.	Slight	Slight.
Oatlands	Slight	Slight	Moderate: slope, small stones, depth to rock.	Slight	Moderate: droughty, depth to rock.
52C*:					
Sudley	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Oatlands	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: droughty, slope, depth to rock.
53B*:					
Sycoline	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Moderate: wetness.	Moderate: wetness, depth to rock.
Kelly	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Moderate: wetness.	Moderate: wetness.
53C*:					
Sycoline	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Moderate: wetness, slope, depth to rock.
Kelly	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Moderate: wetness.	Moderate: wetness.
54B*:					
Urban land.					
Udorthents.					
55D--- Watt	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
55E--- Watt	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
56A--- Waxpool	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
1A---------- Aden	Poor	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
2B*:										
Airmont----------	Poor	Fair	Good	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
Weverton----------	Very poor.	Poor	Fair	Poor	Poor	Poor	Very poor.	Poor	Poor	Very poor.
2C*:										
Airmont----------	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Weverton----------	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
2D*:										
Airmont----------	Poor	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Weverton----------	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
2E*:										
Airmont----------	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Very poor.	Fair	Very poor.
Weverton----------	Very poor.	Very poor.	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
3A---------- Albano	Poor	Fair	Fair	Fair	Fair	Good	Poor	Fair	Fair	Fair.
4B---------- Arcola	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
5C*:										
Arcola----------	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
Nestoria----------	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
5D*:										
Arcola----------	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Nestoria----------	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
6A---------- Baile	Poor	Fair	Good	Fair	Fair	Good	Poor	Fair	Fair	Fair.
7A---------- Bermudian	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
8C---------- Braddock	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
9B---------- Brentsville	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
9C---------- Brentsville	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
10B---------- Buckhall	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
10C---------- Buckhall	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
11B---------- Calverton	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
12D---------- Catlett	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
13B*:										
Catlett----------	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Sycoline----------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
13C*:										
Catlett----------	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Sycoline----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
14A---------- Codorus	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
15A---------- Comus	Poor	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
16A---------- Delanco	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
17A---------- Dulles	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
18C---------- Dumfries	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
18D---------- Dumfries	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
18E---------- Dumfries	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
19B---------- Elioak	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
19C---------- Elioak	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
20B---------- Elsinboro	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
21B---------- Fairfax	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
21C---------- Fairfax	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
22A---------- Featherstone	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Good	Good	Very poor.	Very poor.	Good.
23C---------- Gaila	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
23D---------- Gaila	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
23E---------- Gaila	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
24B*:										
Glenelg----------	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Buckhall----------	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
24C*:										
Glenelg----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Buckhall----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
24D*:										
Glenelg----------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Buckhall----------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
25A---------- Glenville	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
26A---------- Hatboro	Poor	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
27A*:										
Hatboro----------	Poor	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
Codorus----------	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
28B---------- Haymarket	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
28C---Haymarket	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
29B---Hoadly	Fair	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Poor.
30B---Jackland	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
31B*:										
Jackland	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Haymarket	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
31C*:										
Jackland	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Haymarket	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
32A---Kelly	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
33B*:										
Legore	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Oakhill	Poor	Fair	Good	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
33C*:										
Legore	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Oakhill	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
33D*:										
Legore	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Oakhill	Poor	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
34B---Lunt	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
34C---Lunt	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
34D---Lunt	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
35B---Manassas	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
36D---Marr	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
36E---Marr	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
37A---Marumsco	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
38B---Meadowville	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
39B3---Minnieville	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
39C3---Minnieville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
40B---Montalto	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
40C---Montalto	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
41B---Neabsco	Good	Good	Good	Good	Fair	Poor	Very poor.	Good	Good	Very poor.
41C---Neabsco	Good	Good	Good	Good	Fair	Very poor.	Very poor.	Good	Good	Very poor.
42B*:										
Neabsco----	Good	Good	Good	Good	Fair	Poor	Very poor.	Good	Good	Very poor.
Quantico----	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
43D, 43E---Nestoria	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
44D---Occoquan	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
44E---Occoquan	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
45C---Orenda	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
46B---Panorama	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
46C---Panorama	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
47B---Quantico	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
47C---Quantico	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
47D---------- Quantico	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
48A---------- Reaville	Poor	Fair	Fair	Poor	Poor	Poor	Poor	Fair	Poor	Poor.
49A---------- Rowland	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
50D---------- Spriggs	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
50E---------- Spriggs	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
51D---------- Stumptown	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Poor	Very poor.
51E---------- Stumptown	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
52B*:										
Sudley----------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Oatlands----------	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
52C*:										
Sudley----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Oatlands----------	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
53B*:										
Sycoline----------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Kelly----------	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
53C*:										
Sycoline----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Kelly----------	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
54B*:										
Urban land.										
Udorthents.										
55D---------- Watt	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
55E.										
Watt----------	Very poor.	Fair	Fair	Poor	Poor	Poor	Very poor.	Poor	Poor	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
56A---------- Waxpool	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1A---------- Aden	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness.
2B*: Airmont----------	Severe: wetness.	Moderate: wetness, large stones.	Severe: wetness.	Moderate: wetness, slope, large stones.	Moderate: wetness, frost action.	Severe: large stones.
Weverton---------	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones, droughty.
2C*: Airmont----------	Severe: wetness.	Moderate: wetness, slope, large stones.	Severe: wetness.	Severe: slope.	Moderate: wetness, frost action, slope.	Severe: large stones.
Weverton---------	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: slope, large stones.	Severe: large stones.	Severe: large stones, droughty.
2D*, 2E*: Airmont----------	Severe: wetness, slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Severe: slope.	Severe: large stones, slope.
Weverton---------	Severe: large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, droughty, slope.
3A---------- Albano	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness, frost action.	Severe: wetness.
4B---------- Arcola	Moderate: depth to rock.	Slight---------	Moderate: depth to rock.	Moderate: slope.	Moderate: low strength, frost action.	Moderate: depth to rock.
5C*: Arcola----------	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: slope, depth to rock.
Nestoria---------	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, frost action.	Severe: droughty, depth to rock.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
5D*:						
Arcola	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Nestoria	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.
6A Baile	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.
7A Bermudian	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding, low strength.	Moderate: flooding.
8C Braddock	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
9B Brentsville	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock, frost action.	Moderate: depth to rock.
9C Brentsville	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, frost action.	Moderate: slope, depth to rock.
10B Buckhall	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
10C Buckhall	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
11B Calverton	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness, droughty.
12D Catlett	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.
13B*:						
Catlett	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock, frost action.	Severe: depth to rock.
Sycoline	Severe: depth to rock, wetness.	Moderate: wetness, shrink-swell.	Severe: wetness, depth to rock.	Moderate: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Moderate: wetness, depth to rock.
13C*:						
Catlett	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, frost action.	Severe: depth to rock.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
13C*: Sycoline	Severe: depth to rock, wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness, depth to rock.	Severe: slope.	Severe: low strength, frost action.	Moderate: wetness, slope, depth to rock.
14A--- Codorus	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.	Severe: wetness, flooding.	Severe: flooding, frost action.	Severe: flooding.
15A--- Comus	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
16A--- Delanco	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, frost action.	Moderate: wetness.
17A--- Dulles	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, frost action, shrink-swell.	Moderate: wetness.
18C--- Dumfries	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: droughty, slope.
18D, 18E--- Dumfries	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
19B--- Elioak	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: large stones, droughty.
19C--- Elioak	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: large stones, droughty, slope.
20B--- Elsinboro	Moderate: wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: low strength, flooding.	Slight.
21B--- Fairfax	Moderate: too clayey.	Moderate: shrink-swell.	Slight---	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
21C--- Fairfax	Moderate: slope, too clayey.	Moderate: shrink-swell, slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
22A--- Featherstone	Severe: ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: ponding, flooding.	Severe: ponding, flooding.
23C--- Gaila	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
23D, 23E---------- Gaila	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
24B*:						
Glenelg----------	Slight---------	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Slight.
Buckhall---------	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
24C*:						
Glenelg----------	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
Buckhall---------	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
24D*:						
Glenelg----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Buckhall---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
25A---------- Glenville	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.
26A---------- Hatboro	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness, frost action.	Severe: flooding, wetness.
27A*:						
Hatboro----------	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness, frost action.	Severe: flooding, wetness.
Codorus----------	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.	Severe: wetness, flooding.	Severe: flooding, frost action.	Severe: flooding.
28B---------- Haymarket	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, frost action, shrink-swell.	Slight.
28C---------- Haymarket	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, frost action, shrink-swell.	Moderate: slope.
29B---------- Hoadly	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
30B---------- Jackland	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, frost action, shrink-swell.	Moderate: wetness.
31B*:						
Jackland---------	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, frost action, shrink-swell.	Moderate: wetness.
Haymarket--------	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, frost action, shrink-swell.	Slight.
31C*:						
Jackland---------	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell, slope.	Severe: low strength, frost action, shrink-swell.	Moderate: wetness, slope.
Haymarket--------	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, frost action, shrink-swell.	Moderate: slope.
32A---------- Kelly	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: wetness.
33B*:						
Legore-----------	Slight---------	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Moderate: small stones, large stones.
Oakhill----------	Moderate: depth to rock.	Slight---------	Moderate: depth to rock.	Moderate: slope.	Moderate: frost action.	Severe: droughty.
33C*:						
Legore-----------	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones, large stones, slope.
Oakhill----------	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope, frost action.	Severe: droughty, slope.
33D*:						
Legore-----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Oakhill----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
34B---------- Lunt	Severe: cutbanks cave.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
34C---------- Lunt	Severe: cutbanks cave.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
34D---------- Lunt	Severe: cutbanks cave, slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
35B---------- Manassas	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength.	Slight.
36D, 36E---------- Marr	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
37A---------- Marumsco	Severe: cutbanks cave, wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, frost action, shrink-swell.	Moderate: wetness.
38B---------- Meadowville	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
39B3---------- Minnieville	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
39C3---------- Minnieville	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
40B---------- Montalto	Moderate: too clayey, dense layer.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: small stones.
40C---------- Montalto	Moderate: too clayey, dense layer, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: small stones, slope.
41B---------- Neabsco	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
41C---------- Neabsco	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, slope.	Severe: frost action.	Moderate: wetness, slope.
42B*: Neabsco----------	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
Quantico---------	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
43D, 43E---------- Nestoria	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.
44D, 44E---------- Occoquan	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
45C---------- Orenda	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
46B---------- Panorama	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
46C---------- Panorama	Moderate: slope.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
47B---------- Quantico	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
47C---------- Quantico	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
47D---------- Quantico	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.
48A---------- Reaville	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness, thin layer.
49A---------- Rowland	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Severe: flooding.
50D, 50E---------- Spriggs	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
51D, 51E---------- Stumptown	Severe: depth to rock, large stones, slope.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, droughty, slope.
52B*:						
Sudley----------	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, frost action.	Slight.
Oatlands---------	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Moderate: depth to rock, frost action.	Moderate: droughty, depth to rock.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
52C*: Sudley	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: slope.
Oatlands	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, frost action, slope.	Moderate: droughty, slope, depth to rock.
53B*: Sycoline	Severe: depth to rock, wetness.	Moderate: wetness, shrink-swell.	Severe: wetness, depth to rock.	Moderate: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Moderate: wetness, depth to rock.
Kelly	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: wetness.
53C*: Sycoline	Severe: depth to rock, wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness, depth to rock.	Severe: slope.	Severe: low strength, frost action.	Moderate: wetness, slope, depth to rock.
Kelly	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: wetness.
54B*: Urban land. Udorthents.						
55D, 55E--- Watt	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
56A--- Waxpool	Severe: cutbanks cave, wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, wetness, frost action.	Severe: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "poor," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1A Aden	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
2B*: Airmont	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage.	Poor: large stones.
Weverton	Severe: large stones.	Severe: large stones.	Severe: depth to rock, large stones.	Moderate: depth to rock.	Poor: large stones.
2C*: Airmont	Severe: wetness, percs slowly.	Severe: seepage, slope, wetness.	Severe: seepage, wetness.	Severe: seepage.	Poor: large stones.
Weverton	Severe: large stones.	Severe: slope, large stones.	Severe: depth to rock, large stones.	Moderate: depth to rock, slope.	Poor: large stones.
2D*, 2E*: Airmont	Severe: wetness, percs slowly, slope.	Severe: seepage, slope, wetness.	Severe: seepage, wetness, slope.	Severe: seepage, slope.	Poor: large stones, slope.
Weverton	Severe: slope, large stones.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope.	Poor: large stones, slope.
3A Albano	Severe: percs slowly, wetness.	Severe: wetness.	Severe: depth to rock, wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
4B Arcola	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
5C*: Arcola	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
Nestoria	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
5D*: Arcola	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
Nestoria	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
6A Baile	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
7A Bermudian	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Fair: too clayey, small stones, wetness.
8C Braddock	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage, too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
9B Brentsville	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
9C Brentsville	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
10B Buckhall	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight	Poor: too clayey.
10C Buckhall	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
11B Calverton	Severe: wetness, percs slowly.	Severe: wetness.	Severe: depth to rock, wetness.	Severe: wetness.	Poor: small stones, wetness.
12D Catlett	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, seepage, small stones.
13B*: Catlett	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, seepage, small stones.
Sycoline	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock.	Poor: depth to rock.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
13C*: Catlett	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, seepage, small stones.
Sycoline	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, slope, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock.	Poor: depth to rock.
14A Codorus	Severe: flooding, wetness, poor filter.	Severe: flooding, wetness, seepage.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Poor: wetness.
15A Comus	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Poor: small stones.
16A Delanco	Severe: wetness, percs slowly.	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
17A Dulles	Severe: wetness, percs slowly.	Severe: wetness.	Severe: depth to rock, wetness, too clayey.	Severe: wetness.	Poor: too clayey, wetness.
18C Dumfries	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: too sandy, slope.
18D, 18E Dumfries	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
19B Elioak	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.
19C Elioak	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, hard to pack, slope.
20B Elsinboro	Moderate: flooding, wetness, percs slowly.	Severe: seepage, flooding.	Severe: seepage, wetness.	Severe: seepage.	Fair: small stones.
21B Fairfax	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
21C Fairfax	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
22A---------- Featherstone	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Poor: ponding.
23C---------- Gaila	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: too sandy, slope.
23D, 23E---------- Gaila	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
24B*:					
Glenelg----------	Moderate: percs slowly.	Moderate: seepage, slope.	Slight----------	Slight----------	Poor: small stones.
Buckhall----------	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight----------	Poor: too clayey.
24C*:					
Glenelg----------	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: small stones.
Buckhall----------	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
24D*:					
Glenelg----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
Buckhall----------	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, slope.
25A---------- Glenville	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Poor: wetness, thin layer.
26A---------- Hatboro	Severe: flooding, wetness.	Severe: flooding, wetness, seepage.	Severe: flooding, wetness, seepage.	Severe: flooding, wetness.	Poor: wetness.
27A*:					
Hatboro----------	Severe: flooding, wetness.	Severe: flooding, wetness, seepage.	Severe: flooding, wetness, seepage.	Severe: flooding, wetness.	Poor: wetness.
Codorus----------	Severe: flooding, wetness, poor filter.	Severe: flooding, wetness, seepage.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Poor: wetness.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
28B---------- Haymarket	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight----------	Poor: too clayey, hard to pack.
28C---------- Haymarket	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
29B---------- Hoadly	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: seepage, wetness.	Poor: wetness.
30B---------- Jackland	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
31B*: Jackland----------	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Haymarket----------	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight----------	Poor: too clayey, hard to pack.
31C*: Jackland----------	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Haymarket----------	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
32A---------- Kelly	Severe: wetness, percs slowly.	Severe: wetness.	Severe: depth to rock, wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
33B*: Legore----------	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
Oakhill----------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
33C*: Legore----------	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: small stones.
Oakhill----------	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
33D*:					
Legore	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
Oakhill	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
34B	Severe: poor filter.	Severe: seepage.	Severe: seepage, too clayey.	Severe: seepage.	Poor: too clayey, hard to pack.
Lunt					
34C	Severe: poor filter.	Severe: slope, seepage.	Severe: seepage, too clayey.	Severe: seepage.	Poor: too clayey, hard to pack.
Lunt					
34D	Severe: poor filter, slope.	Severe: slope, seepage.	Severe: seepage, slope, too clayey.	Severe: seepage, slope.	Poor: too clayey, hard to pack, slope.
Lunt					
35B	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Fair: too clayey, wetness.
Manassas					
36D, 36E	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
Marr					
37A	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Marumsco					
38B	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Fair: too clayey, wetness.
Meadowville					
39B3	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.
Minnieville					
39C3	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, hard to pack, slope.
Minnieville					
40B	Severe: percs slowly.	Moderate: seepage, slope.	Severe: wetness, too clayey.	Severe: seepage.	Poor: too clayey, hard to pack.
Montalto					
40C	Severe: percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Severe: seepage.	Poor: too clayey, hard to pack.
Montalto					
41B	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.
Neabsco					

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
41C---------- Neabsco	Severe: wetness, percs slowly.	Severe: seepage, slope, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.
42B*:					
Neabsco----------	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.
Quantico----------	Moderate: percs slowly.	Severe: seepage.	Severe: seepage, too clayey.	Slight----------	Poor: too clayey, hard to pack.
43D, 43E---------- Nestoria	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
44D, 44E---------- Occoquan	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: slope.
45C---------- Orenda	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
46B---------- Panorama	Moderate: depth to rock, percs slowly.	Moderate: depth to rock, slope, seepage.	Severe: depth to rock.	Moderate: depth to rock.	Fair: depth to rock, too clayey, small stones.
46C---------- Panorama	Moderate: depth to rock, percs slowly, slope.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Fair: depth to rock, too clayey, small stones.
47B---------- Quantico	Moderate: percs slowly.	Severe: seepage.	Severe: seepage, too clayey.	Slight----------	Poor: too clayey, hard to pack.
47C---------- Quantico	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage, too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
47D---------- Quantico	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
48A---------- Reaville	Severe: wetness, depth to rock, percs slowly.	Severe: wetness, depth to rock, percs slowly.	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Poor: area reclaim, wetness, small stones.
49A---------- Rowland	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Poor: wetness.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
50D, 50E---------- Spriggs	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
51D, 51E---------- Stumptown	Severe: depth to rock, large stones, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, large stones, slope.
52B*:					
Sudley----------	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight----------	Fair: too clayey, small stones.
Oatlands----------	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, small stones.
52C*:					
Sudley----------	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, small stones, slope.
Oatlands----------	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, small stones.
53B*:					
Sycoline----------	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock.	Poor: depth to rock.
Kelly----------	Severe: wetness, percs slowly.	Severe: wetness.	Severe: depth to rock, wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
53C*:					
Sycoline----------	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, slope, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock.	Poor: depth to rock.
Kelly----------	Severe: wetness, percs slowly.	Severe: wetness.	Severe: depth to rock, wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
54B*: Urban land. Udorthents.					
55D, 55E---------- Watt	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope, small stones.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
56A---------- Waxpool	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
1A Aden	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
2B*, 2C*: Airmont	Fair: large stones, wetness.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim.
Weverton	Poor: large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim.
2D*: Airmont	Fair: large stones, wetness, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim, slope.
Weverton	Poor: large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim, slope.
2E*: Airmont	Poor: slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim, slope.
Weverton	Poor: large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim, slope.
3A Albano	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, wetness.
4B Arcola	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
5C*: Arcola	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Nestoria	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
5D*: Arcola	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
5D*: Nestoria	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
6A Baile	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
7A Bermudian	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
8C Braddock	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
9B, 9C Brentsville	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
10B, 10C Buckhall	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
11B Calverton	Fair: area reclaim, thin layer, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
12D Catlett	Poor: depth to rock.	Improbable: small stones.	Improbable: thin layer.	Poor: depth to rock, small stones, slope.
13B*: Catlett	Poor: depth to rock.	Improbable: small stones.	Improbable: thin layer.	Poor: depth to rock, small stones.
Sycoline	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, too clayey.
13C*: Catlett	Poor: depth to rock.	Improbable: small stones.	Improbable: thin layer.	Poor: depth to rock, small stones.
Sycoline	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, too clayey, slope.
14A Codorus	Fair: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
15A Comus	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
16A---------- Delanco	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
17A---------- Dulles	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
18C---------- Dumfries	Good----------	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
18D---------- Dumfries	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
18E---------- Dumfries	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
19B, 19C---------- Elioak	Good----------	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
20B---------- Elsinboro	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
21B, 21C---------- Fairfax	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
22A---------- Featherstone	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
23C---------- Gaila	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
23D---------- Gaila	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
23E---------- Gaila	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
24B*, 24C*: Glenelg----------	Fair: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Buckhall----------	Good----------	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
24D*: Glenelg----------	Fair: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Buckhall----------	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
25A---------- Glenville	Poor: wetness, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, wetness.
26A---------- Hatboro	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
27A*:				
Hatboro----------	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Codorus----------	Fair: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
28B, 28C---------- Haymarket	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer.
29B---------- Hoadly	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
30B---------- Jackland	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
31B*, 31C*:				
Jackland----------	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Haymarket----------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer.
32A---------- Kelly	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
33B*, 33C*:				
Legore----------	Fair: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Oakhill----------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
33D*:				
Legore----------	Fair: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Oakhill----------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
34B, 34C---------- Lunt	Poor: low strength.	Improbable: thin layer.	Improbable: thin layer.	Poor: area reclaim.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
34D---------- Lunt	Poor: low strength.	Improbable: thin layer.	Improbable: thin layer.	Poor: area reclaim, slope.
35B---------- Manassas	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
36D---------- Marr	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
36E---------- Marr	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
37A---------- Marumsco	Poor: shrink-swell.	Improbable: excess fines.	Improbable: too sandy.	Poor: thin layer.
38B---------- Meadowville	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
39B3, 39C3---------- Minnieville	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
40B, 40C---------- Montalto	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
41B, 41C---------- Neabsco	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.
42B*:				
Neabsco----------	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.
Quantico----------	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
43D---------- Nestoria	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
43E---------- Nestoria	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
44D---------- Occoquan	Fair: depth to rock, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
44E---------- Occoquan	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
45C---------- Orenda	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
46B, 46C---------- Panorama	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
47B, 47C---------- Quantico	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
47D---------- Quantico	Fair: slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
48A---------- Reaville	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
49A---------- Rowland	Fair: wetness, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
50D---------- Spriggs	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
50E---------- Spriggs	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
51D---------- Stumptown	Poor: depth to rock, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, slope.
51E---------- Stumptown	Poor: depth to rock, large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, slope.
52B*:				
Sudley----------	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Oatlands----------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
52C*:				
Sudley----------	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
Oatlands----------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
53B*:				
Sycoline----------	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, too clayey.
Kelly----------	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
53C*:				
Sycoline	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, too clayey, slope.
Kelly	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
54B*:				
Urban land.				
Udorthents.				
55D	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Watt				
55E	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Watt				
56A	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
Waxpool				

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
1A Aden	Moderate: seepage.	Severe: wetness.	Percs slowly, flooding, frost action.	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
2B*: Airmont	Severe: seepage.	Severe: piping, large stones.	Percs slowly, large stones, slope.	Large stones, wetness, droughty.	Large stones, wetness.	Large stones, droughty.
Weverton	Moderate: seepage, depth to rock, slope.	Severe: large stones.	Deep to water	Large stones, droughty, slope.	Large stones	Large stones, droughty.
2C*, 2D*, 2E*: Airmont	Severe: seepage, slope.	Severe: piping, large stones.	Percs slowly, large stones, slope.	Large stones, wetness, droughty.	Slope, large stones, wetness.	Large stones, slope, droughty.
Weverton	Severe: slope.	Severe: large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, droughty, slope.
3A Albano	Moderate: depth to rock.	Severe: wetness.	Percs slowly, frost action.	Wetness, percs slowly.	Percs slowly, wetness, erodes easily.	Percs slowly, wetness, erodes easily.
4B Arcola	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope, erodes easily.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
5C*, 5D*: Arcola	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Nestoria	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Slope, droughty, depth to rock.
6A Baile	Slight	Severe: piping, wetness.	Percs slowly, frost action.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
7A Bermudian	Severe: seepage.	Severe: piping.	Deep to water	Flooding, erodes easily.	Favorable	Favorable.
8C Braddock	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope, large stones.	Slope.
9B Brentsville	Moderate: seepage, slope, depth to rock.	Severe: seepage, piping.	Deep to water	Depth to rock, slope.	Depth to rock	Depth to rock.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
9C---------- Brentsville	Severe: slope.	Severe: seepage, piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
10B---------- Buckhall	Moderate: seepage, slope.	Moderate: thin layer.	Deep to water	Slope----------	Favorable------	Favorable.
10C---------- Buckhall	Severe: slope.	Moderate: thin layer.	Deep to water	Slope----------	Slope----------	Slope.
11B---------- Calverton	Moderate: seepage, depth to rock, slope.	Severe: seepage, wetness.	Percs slowly, frost action, slope.	Wetness, droughty, percs slowly.	Erodes easily, wetness, rooting depth.	Wetness, erodes easily, droughty.
12D---------- Catlett	Severe: depth to rock, slope.	Severe: seepage.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Slope, droughty, depth to rock.
13B*: Catlett----------	Severe: depth to rock.	Severe: seepage.	Deep to water	Droughty, depth to rock, slope.	Depth to rock	Droughty, depth to rock.
Sycoline---------	Moderate: depth to rock, slope.	Severe: thin layer.	Percs slowly, depth to rock, frost action.	Wetness, percs slowly, depth to rock.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
13C*: Catlett----------	Severe: depth to rock, slope.	Severe: seepage.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Slope, droughty, depth to rock.
Sycoline---------	Severe: slope.	Severe: thin layer.	Percs slowly, depth to rock, frost action.	Wetness, percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
14A---------- Codorus	Severe: seepage.	Severe: wetness.	Flooding, frost action.	Flooding, wetness.	Wetness--------	Flooding, wetness.
15A---------- Comus	Severe: seepage.	Severe: seepage, piping.	Deep to water	Flooding-------	Favorable------	Favorable.
16A---------- Delanco	Moderate: seepage.	Severe: thin layer, wetness.	Frost action---	Wetness--------	Erodes easily, wetness.	Wetness, erodes easily.
17A---------- Dulles	Moderate: depth to rock.	Severe: wetness.	Percs slowly, frost action.	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
18C, 18D, 18E----- Dumfries	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Droughty, slope.	Slope, too sandy.	Slope.
19B---------- Elioak	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Droughty, slope.	Favorable------	Droughty.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
19C---------- Elioak	Severe: slope.	Severe: hard to pack.	Deep to water	Droughty, slope.	Slope----------	Slope, droughty.
20B---------- Elsinboro	Severe: seepage.	Severe: piping.	Deep to water	Slope----------	Favorable------	Favorable.
21B---------- Fairfax	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
21C---------- Fairfax	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
22A---------- Featherstone	Moderate: seepage.	Severe: ponding, piping.	Ponding, flooding.	Ponding, erodes easily, flooding.	Erodes easily, ponding.	Wetness, excess salt, erodes easily.
23C---------- Gaila	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope----------	Slope----------	Slope.
23D, 23E---------- Gaila	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope----------	Slope----------	Slope.
24B*:						
Glenelg----------	Moderate: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope----------	Favorable------	Favorable.
Buckhall---------	Moderate: seepage, slope.	Moderate: thin layer.	Deep to water	Slope----------	Favorable------	Favorable.
24C*, 24D*:						
Glenelg----------	Severe: slope.	Severe: seepage, piping.	Deep to water	Slope----------	Slope----------	Slope.
Buckhall---------	Severe: slope.	Moderate: thin layer.	Deep to water	Slope----------	Slope----------	Slope.
25A---------- Glenville	Slight---------	Severe: piping, wetness.	Frost action---	Wetness, rooting depth.	Wetness, rooting depth.	Wetness, rooting depth.
26A---------- Hatboro	Severe: seepage.	Severe: piping, wetness.	Flooding, frost action.	Wetness, flooding.	Wetness--------	Wetness.
27A*:						
Hatboro----------	Severe: seepage.	Severe: piping, wetness.	Flooding, frost action.	Wetness, flooding.	Wetness--------	Wetness.
Codorus----------	Severe: seepage.	Severe: wetness.	Flooding, frost action.	Flooding, wetness.	Wetness--------	Flooding, wetness.
28B---------- Haymarket	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope----------	Favorable------	Favorable.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
28C---------- Haymarket	Severe: slope.	Severe: hard to pack.	Deep to water	Slope----------	Slope----------	Slope.
29B---------- Hoadly	Moderate: seepage, slope.	Severe: piping, wetness.	Percs slowly, slope.	Wetness, percs slowly, rooting depth.	Wetness, rooting depth.	Wetness, rooting depth.
30B---------- Jackland	Moderate: seepage, slope.	Severe: hard to pack.	Percs slowly, frost action, slope.	Wetness, percs slowly, slope.	Wetness, percs slowly.	Wetness, percs slowly.
31B*: Jackland---------	Moderate: seepage, slope.	Severe: hard to pack.	Percs slowly, frost action, slope.	Wetness, percs slowly, slope.	Wetness, percs slowly.	Wetness, percs slowly.
Haymarket--------	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope----------	Favorable------	Favorable.
31C*: Jackland---------	Severe: slope.	Severe: hard to pack.	Percs slowly, frost action, slope.	Wetness, percs slowly, slope.	Slope, wetness, percs slowly.	Wetness, slope, percs slowly.
Haymarket--------	Severe: slope.	Severe: hard to pack.	Deep to water	Slope----------	Slope----------	Slope.
32A---------- Kelly	Moderate: seepage, depth to rock.	Severe: thin layer, wetness.	Percs slowly---	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Erodes easily, percs slowly.
33B*: Legore----------	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope----------	Favorable------	Favorable.
Oakhill----------	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Deep to water	Droughty, depth to rock, slope.	Depth to rock	Droughty, depth to rock.
33C*, 33D*: Legore----------	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope----------	Slope----------	Slope.
Oakhill----------	Severe: slope.	Severe: thin layer.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Slope, droughty, depth to rock.
34B---------- Lunt	Severe: seepage.	Moderate: thin layer, hard to pack.	Deep to water	Slope----------	Favorable------	Favorable.
34C, 34D---------- Lunt	Severe: seepage, slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope----------	Slope----------	Slope.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
35B---------- Manassas	Severe: seepage.	Severe: piping.	Slope----------	Wetness, erodes easily, slope.	Erodes easily, wetness.	Erodes easily.
36D, 36E---------- Marr	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope----------	Slope, erodes easily.	Slope, erodes easily.
37A---------- Marumsco	Moderate: seepage.	Severe: hard to pack.	Percs slowly, frost action.	Wetness, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
38B---------- Meadowville	Severe: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
39B3---------- Minnieville	Moderate: seepage, slope.	Thin layer, hard to pack.	Deep to water	Slope----------	Favorable------	Favorable.
39C3---------- Minnieville	Severe: slope.	Thin layer, hard to pack.	Deep to water	Slope----------	Slope----------	Slope.
40B---------- Montalto	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Rooting depth, slope.	Favorable------	Rooting depth.
40C---------- Montalto	Severe: slope.	Severe: hard to pack.	Deep to water	Rooting depth, slope.	Slope----------	Slope, rooting depth.
41B---------- Neabsco	Severe: seepage.	Severe: piping.	Percs slowly, frost action, slope.	Wetness, percs slowly, rooting depth.	Wetness, rooting depth.	Wetness, rooting depth.
41C---------- Neabsco	Severe: seepage, slope.	Severe: piping.	Percs slowly, frost action, slope.	Wetness, percs slowly, rooting depth.	Slope, wetness, rooting depth.	Wetness, slope, rooting depth.
42B*: Neabsco----------	Severe: seepage.	Severe: piping.	Percs slowly, frost action, slope.	Wetness, percs slowly, rooting depth.	Wetness, rooting depth.	Wetness, rooting depth.
Quantico---------	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope----------	Favorable------	Favorable.
43D, 43E---------- Nestoria	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Slope, droughty, depth to rock.
44D, 44E---------- Occoquan	Severe: seepage, slope.	Severe: piping.	Deep to water	Droughty, slope.	Slope, too sandy.	Slope.
45C---------- Orenda	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
46B---------- Panorama	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
46C---------- Panorama	Severe: slope.	Severe: thin layer.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
47B---------- Quantico	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope----------	Favorable------	Favorable.
47C, 47D---------- Quantico	Severe: slope.	Severe: hard to pack.	Deep to water	Slope----------	Slope----------	Slope.
48A---------- Reaville	Moderate: depth to rock.	Severe: thin layer, piping, wetness.	Percs slowly, depth to rock, frost action.	Wetness, depth to rock, erodes easily.	Depth to rock, wetness, percs slowly.	Depth to rock, wetness, percs slowly.
49A---------- Rowland	Severe: seepage.	Severe: piping, wetness.	Flooding, frost action.	Wetness, erodes easily, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
50D, 50E---------- Spriggs	Severe: slope.	Severe: thin layer, piping.	Deep to water	Slope----------	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
51D, 51E---------- Stumptown	Severe: seepage, slope.	Severe: large stones.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
52B*:						
Sudley----------	Moderate: seepage, slope.	Moderate: thin layer, piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
Oatlands---------	Severe: seepage.	Severe: thin layer.	Deep to water	Droughty, depth to rock, slope.	Depth to rock	Droughty, depth to rock.
52C*:						
Sudley----------	Severe: slope.	Moderate: thin layer, piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
Oatlands---------	Severe: seepage, slope.	Severe: thin layer.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Slope, droughty, depth to rock.
53B*:						
Sycoline---------	Moderate: depth to rock, slope.	Severe: thin layer.	Percs slowly, depth to rock, frost action.	Wetness, percs slowly, depth to rock.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
Kelly----------	Moderate: seepage, depth to rock, slope.	Severe: thin layer, wetness.	Percs slowly, slope.	Wetness, percs slowly, slope.	Erodes easily, wetness, percs slowly.	Erodes easily, percs slowly.
53C*:						
Sycoline---------	Severe: slope.	Severe: thin layer.	Percs slowly, depth to rock, frost action.	Wetness, percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
53C*: Kelly	Severe: slope.	Severe: thin layer, wetness.	Percs slowly, slope.	Wetness, percs slowly, slope.	Erodes easily, wetness, percs slowly.	Erodes easily, percs slowly.
54B*: Urban land. Udorthents.						
55D, 55E--- Watt	Severe: seepage, slope.	Severe: thin layer.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
56A--- Waxpool	Severe: seepage.	Severe: hard to pack, wetness.	Percs slowly, frost action.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
1A----------	0-8	Silt loam--------	CL-ML, CL	A-4, A-6	0-1	95-100	90-98	75-95	60-90	15-30	6-15
Aden	8-31	Silty clay loam, silty clay, clay.	CL, CH	A-6, A-7	0-1	95-100	90-98	80-95	75-90	35-65	20-40
	31-58	Clay loam, silty clay loam, silty clay.	CL	A-6, A-7	0-1	95-100	90-95	75-90	65-90	25-50	15-35
	58-78	Fine sandy loam, loam, silt loam.	CL-ML, CL, SC, SM-SC	A-4, A-6	0-5	85-98	75-95	60-90	45-85	15-30	6-15
	78	Weathered bedrock	---	---	---	---	---	---	---	---	---
2B*, 2C*, 2D*, 2E*:											
Airmont--------	0-11	Very flaggy loam	SM-SC, CL-ML, ML, CL	A-2, A-4	20-40	75-90	60-75	50-70	30-60	<25	NP-10
	11-27	Flaggy clay loam, very flaggy sandy clay loam, very channery clay loam.	SM-SC, CL-ML, SC, CL	A-2, A-4, A-6	10-40	80-90	60-75	50-75	30-60	25-35	5-15
	27-45	Very flaggy loam, very flaggy sandy loam, very channery loam.	GM-GC, CL-ML, GC, CL	A-2, A-4, A-6, A-1	20-45	60-75	55-65	30-60	20-55	20-35	5-15
	45-65	Very flaggy loam, very flaggy clay loam, extremely flaggy loam.	GM-GC, CL-ML, GC, CL	A-2, A-4, A-6	40-80	60-75	50-65	40-60	30-55	<35	NP-20
Weverton-------	0-7	Very flaggy loam	CL-ML, CL, SM-SC, SC	A-4	50-70	80-95	65-90	55-80	40-65	<30	NP-10
	7-38	Very flaggy loam, extremely flaggy sandy clay loam, extremely flaggy clay loam.	CL, SC	A-2, A-6	50-80	80-90	60-80	50-75	30-65	20-40	10-25
	38-52	Extremely flaggy loam, extremely flaggy sandy clay loam, extremely flaggy clay loam.	SM-SC, SC, SM, GC	A-2, A-4	50-80	60-75	55-65	45-60	25-50	<30	NP-10
	52	Weathered bedrock	---	---	---	---	---	---	---	---	---
3A----------	0-7	Silt loam--------	ML, CL-ML	A-4	0	90-100	85-100	75-95	55-90	<30	NP-7
Albano	7-28	Silty clay loam, silty clay, clay.	CL, CH	A-6, A-7	0	90-100	85-100	80-100	75-95	35-55	15-30
	28-40	Extremely gravelly silty clay loam, extremely gravelly silt loam.	GM-GC, GC, GP-GC	A-2	5-30	30-60	10-50	10-45	7-35	25-35	6-15
	40	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
4B---------- Arcola	0-9	Silt loam--------	CL-ML, CL	A-4, A-6	0-2	90-100	75-100	65-95	50-85	20-35	4-15
	9-22	Silt loam, gravelly silty clay loam, gravelly silt loam.	CL, SC	A-6	0-5	85-95	50-85	45-80	35-75	25-40	10-25
	22-28	Very gravelly loam, very gravelly silt loam, extremely gravelly silt loam.	SM-SC, SC, SP-SC	A-1, A-2, A-4, A-6	5-10	75-90	20-50	18-48	12-45	20-35	4-15
	28	Weathered bedrock	---	---	---	---	---	---	---	---	---
5C*, 5D*: Arcola----------	0-9	Silt loam--------	CL-ML, CL	A-4, A-6	0-2	90-100	75-100	65-95	50-85	20-35	4-15
	9-22	Silt loam, gravelly silty clay loam, gravelly silt loam.	CL, SC	A-6	0-5	85-95	50-85	45-80	35-75	25-40	10-25
	22-28	Very gravelly loam, very gravelly silt loam, extremely gravelly silt loam.	SM-SC, SC, SP-SC	A-1, A-2, A-4, A-6	5-10	75-90	20-50	18-48	12-45	20-35	4-15
	28	Weathered bedrock	---	---	---	---	---	---	---	---	---
Nestoria--------	0-8	Gravelly silt loam.	CL-ML, CL, SM-SC, SC	A-2, A-4	0-10	85-100	50-75	45-75	30-65	<30	NP-10
	8-14	Very gravelly loam, very gravelly silt loam, extremely gravelly silt loam.	GW-GC, SW-SC, SM-SC	A-1, A-2, A-4, A-6	5-10	35-75	15-50	14-45	10-40	15-30	6-15
	14-18	Very gravelly loam, very gravelly silt loam, extremely gravelly silt loam.	GW-GC, SW-SC, SM-SC	A-1, A-2, A-4, A-6	10-25	25-75	15-50	14-45	10-40	15-30	6-15
	18-30	Weathered bedrock	---	---	---	---	---	---	---	---	---
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
6A---------- Baile	0-8	Loam----------	CL, ML, MH	A-4, A-6, A-7, A-5	0-10	100	95-100	80-100	60-95	33-67	7-24
	8-45	Silty clay loam, silt loam, clay loam.	CL	A-6	0	80-100	75-100	70-100	50-95	28-34	11-14
	45-62	Loam, sandy loam, silt loam.	ML, CL, SC, SM	A-2, A-4, A-1, A-6	0	80-100	75-100	45-100	20-90	<35	NP-11

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
7A---------- Bermudian	0-12	Silt loam--------	ML	A-4	0	90-100	90-100	70-90	60-80	---	---
	12-38	Silt loam, gravelly silty clay loam, shaly sandy clay loam.	ML, SM, SC	A-4, A-6, A-7-6	0-10	65-90	60-80	55-75	40-60	30-45	8-15
	38-64	Stratified sand to gravelly sand.	ML, GM, SM, CL-ML	A-2, A-4, A-1	0-15	40-95	25-90	20-80	20-65	<20	NP-5
8C---------- Braddock	0-8	Loam----------	CL, SM, ML, SC	A-2, A-4	0-5	85-100	75-95	50-85	25-65	<30	NP-10
	8-55	Clay loam, clay, sandy clay.	MH, CH, CL, SC	A-7, A-2	0-15	80-95	75-90	45-90	20-80	42-60	15-33
	55-69	Loam, sandy clay loam, very cobbly clay.	SC, CL	A-2, A-4, A-6, A-7	0-75	75-95	60-90	55-85	30-70	25-50	8-28
9B, 9C---------- Brentsville	0-11	Sandy loam-------	SM, SM-SC	A-2	0-5	85-100	75-95	45-65	25-35	8-20	NP-6
	11-26	Loam, sandy loam, gravelly sandy loam.	SC, SM, SM-SC	A-1, A-2, A-4	0-10	75-100	50-95	30-85	15-50	10-25	NP-10
	26-34	Loam, sandy loam, gravelly sandy loam.	ML, CL-ML, SM, SM-SC	A-1, A-2, A-4	0-10	75-100	50-95	30-85	20-55	10-25	NP-10
	34-38	Weathered bedrock	---	---	---	---	---	---	---	---	---
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
10B, 10C--------- Buckhall	0-7	Loam----------	CL-ML, CL, SC, SM-SC	A-4, A-6	0-5	85-100	75-95	60-70	45-60	20-35	5-15
	7-12	Loam, sandy clay loam, clay loam.	CL, SC	A-6, A-7	0-5	95-100	75-95	65-85	40-70	20-45	10-25
	12-43	Clay loam, clay	CL	A-6, A-7	0-5	95-100	75-95	65-75	55-70	35-50	15-30
	43-72	Sandy loam, sandy clay loam, clay loam.	CL-ML, CL, SM-SC, SC	A-2, A-4, A-6	0-5	85-95	70-85	40-70	25-60	15-35	5-15
11B---------- Calverton	0-10	Silt loam--------	ML, CL-ML	A-4	0	85-100	85-100	80-100	65-90	<25	NP-7
	10-19	Silty clay loam, silt loam.	CL, CL-ML	A-4, A-6, A-7	0	85-100	85-100	75-100	65-85	25-45	5-20
	19-29	Silt loam, silty clay loam, clay loam.	CL, CL-ML	A-4, A-6	0	85-100	85-100	70-100	50-85	25-40	5-15
	29-55	Very shaly silt loam, shaly silt loam.	GM	A-1, A-2, A-4	0-10	30-55	20-50	15-45	13-45	<30	NP-7
	55	Weathered bedrock	---	---	---	---	---	---	---	---	---
12D---------- Catlett	0-6	Gravelly silt loam.	ML, CL-ML, GM, GM-GC	A-4	0-5	55-80	50-75	45-65	35-55	<25	NP-10
	6-12	Very gravelly silt loam, extremely gravelly silt loam.	GM, GM-GC, GP-GM, GC	A-1, A-2, A-4	0-10	25-55	10-50	8-45	7-40	<30	NP-10
	12-17	Very gravelly silt loam, extremely gravelly silt loam.	GM, GM-GC, GP-GM, GC	A-1, A-2	0-10	25-45	10-35	8-35	7-30	<30	NP-10
	17	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
13B*:											
Catlett---------	0-6	Gravelly silt loam.	ML, CL-ML, GM, GM-GC	A-4	0-5	55-80	50-75	45-65	35-55	<25	NP-10
	6-12	Very gravelly silt loam, extremely gravelly silt loam.	GM, GM-GC, GP-GM, GC	A-1, A-2, A-4	0-10	25-55	10-50	8-45	7-40	<30	NP-10
	12-17	Very gravelly silt loam, extremely gravelly silt loam.	GM, GM-GC, GP-GM, GC	A-1, A-2	0-10	25-45	10-35	8-35	7-30	<30	NP-10
	17	Weathered bedrock	---	---	---	---	---	---	---	---	---
Sycoline--------	0-9	Silt loam--------	CL-ML, CL	A-4, A-6	0-5	90-100	75-100	70-95	65-90	20-35	6-15
	9-22	Silt loam, silty clay loam.	CL	A-6	0-5	90-100	85-100	80-95	70-90	25-40	10-25
	22-26	Silt loam, silty clay loam.	CL	A-6, A-7	0-5	90-100	75-100	65-90	55-75	30-45	15-30
	26-33	Loam, silt loam	CL-ML, CL	A-4, A-6	0-5	90-100	75-100	65-95	55-75	20-35	6-20
	33	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
13C*:											
Catlett---------	0-6	Gravelly silt loam.	ML, CL-ML, GM, GM-GC	A-4	0-5	55-80	50-75	45-65	35-55	<25	NP-10
	6-12	Very gravelly silt loam, extremely gravelly silt loam.	GM, GM-GC, GP-GM, GC	A-1, A-2, A-4	0-10	25-55	10-50	8-45	7-40	<30	NP-10
	12-17	Very gravelly silt loam, extremely gravelly silt loam.	GM, GM-GC, GP-GM, GC	A-1, A-2	0-10	25-45	10-35	8-35	7-30	<30	NP-10
	17	Weathered bedrock	---	---	---	---	---	---	---	---	---
Sycoline--------	0-9	Silt loam--------	CL-ML, CL	A-4, A-6	0-5	90-100	75-100	70-95	65-90	20-35	6-15
	9-22	Silt loam, silty clay loam.	CL	A-6	0-5	90-100	85-100	80-95	70-90	25-40	10-25
	22-26	Silt loam, silty clay loam.	CL	A-6, A-7	0-5	90-100	75-100	65-90	55-75	30-45	15-30
	26-33	Loam, silt loam	CL-ML, CL	A-4, A-6	0-5	90-100	75-100	65-95	55-75	20-35	6-20
	33	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
14A---------- Codorus	0-12	Loam----------	ML, CL, CL-ML	A-4, A-6	0	80-100	70-100	65-100	55-95	22-35	2-12
	12-42	Silt loam, loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0	80-100	75-100	65-100	55-85	22-35	2-12
	42-65	Stratified sand to silt.	SM, GM, ML	A-1, A-2, A-4	0	25-100	20-100	20-85	15-65	<35	NP-7
15A---------- Comus	0-39	Loam----------	ML, SM, CL, SC	A-2, A-4, A-6	0-5	85-100	80-100	55-100	30-90	30-40	6-15
	39-70	Stratified gravelly sandy loam to silty clay loam.	GM, SM, ML, CL	A-1, A-2, A-4, A-6	0-20	55-100	45-100	25-100	15-95	<40	NP-20

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
16A---------- Delanco	0-11	Fine sandy loam	ML, CL, SM, SC	A-4, A-6	0	90-100	90-100	75-90	45-85	<30	NP-15
	11-45	Silty clay loam, clay loam, loam.	CL, ML	A-6, A-7	0	90-100	90-100	75-100	55-95	25-45	10-25
	45-76	Stratified gravelly sandy loam to silty clay loam.	ML, CL, SM, SC	A-2, A-4, A-6	0	75-95	60-90	35-85	20-80	<35	NP-15
17A---------- Dulles	0-8	Silt loam--------	CL	A-6	0-5	95-100	85-100	80-90	60-80	20-35	10-20
	8-34	Silty clay loam, silty clay.	CL	A-6, A-7	0-5	95-100	85-100	80-85	70-80	35-50	20-30
	34-43	Silty clay, clay	CL, CH	A-6, A-7	5-35	85-95	75-90	65-75	60-70	35-55	20-40
	43	Weathered bedrock	---	---	---	---	---	---	---	---	---
18C, 18D, 18E---- Dumfries	0-10	Sandy loam-------	SM-SC, SM, SC	A-2, A-4	0-5	95-100	75-98	50-65	25-50	<30	NP-10
	10-29	Sandy loam, loam, sandy clay loam.	CL-ML, CL, SM-SC, SC	A-2, A-4, A-6	0-5	95-100	75-98	50-90	25-65	25-35	5-15
	29-35	Loamy sand, sandy loam, loam.	CL-ML, CL, SM-SC, SC	A-1, A-2, A-4	0-5	95-100	80-100	45-90	15-65	<30	NP-10
	35-72	Loamy sand, sandy loam.	SM-SC, SM, SC	A-1, A-2, A-4	0-2	95-100	80-100	45-65	15-40	<25	NP-8
19B, 19C--------- Elioak	0-5	Loam-------------	ML, CL, SM	A-4, A-6, A-7	0-10	90-100	80-100	55-100	35-85	30-45	5-20
	5-41	Silty clay loam, clay loam, silty clay.	CL, CH, MH, ML	A-6, A-7	0-5	90-100	90-100	70-100	50-90	35-58	11-26
	41-72	Silt loam, loam, gravelly fine sandy loam.	MS, SM, GM	A-4, A-5, A-2	0-5	65-100	65-100	60-100	30-85	35-50	NP-10
20B---------- Elsinboro	0-9	Sandy loam-------	ML, CL, SM, SC	A-2, A-4	0-5	85-100	85-100	60-90	30-75	20-35	5-10
	9-44	Silty clay loam, silt loam, loam.	ML, CL	A-4, A-6, A-7	0-5	85-100	85-100	75-95	50-85	35-50	2-20
	44-65	Stratified gravelly sandy loam to sandy clay loam.	SM, SC, ML, CL	A-2, A-4, A-6, A-7	0-10	85-100	70-95	40-90	25-50	10-45	2-20
21B, 21C--------- Fairfax	0-8	Loam-------------	ML, CL, CL-ML	A-4	0	95-100	90-100	75-100	55-90	18-30	NP-10
	8-14	Silty clay loam, clay loam.	CL	A-6, A-7	0	95-100	90-100	80-100	65-95	36-50	12-24
	14-60	Gravelly silty clay loam, gravelly clay loam, gravelly clay.	CL	A-6, A-7	0	75-85	65-75	60-70	50-65	32-44	12-20
	60-75	Silt loam, loam, clay loam.	ML, CL, CL-ML, SC	A-4	0	95-100	90-100	75-100	45-90	18-30	NP-10
22A---------- Featherstone	0-14	Silt loam--------	CL-ML, CL	A-6, A-4	0-1	95-100	90-100	80-100	65-90	20-35	6-15
	14-72	Loam, silt loam	CL-ML, CL	A-6, A-4	0-1	95-100	85-98	75-90	60-85	20-35	6-15

See footnote at end of table.

TABLE 14--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
23C---------- Gaila	0-7	Sandy loam-------	CL-ML, CL, ML	A-2, A-4, A-6	0-5	80-100	75-95	65-90	50-70	15-30	6-12
	7-15	Sandy clay loam, loam, sandy loam.	CL, SC	A-2, A-4, A-6	0-5	80-100	75-95	50-90	25-70	20-35	8-15
	15-43	Sandy loam, loam	CL-ML, SM-SC, CL, SC	A-2, A-4, A-6	0-10	80-95	70-95	45-90	25-70	15-30	6-12
	43-72	Loamy sand, sandy loam, loam.	SM-SC, CL-ML, SC	A-1, A-2, A-4	0-10	80-95	70-95	40-90	15-65	<30	NP-10
23D, 23E--------- Gaila	0-7	Sandy loam-------	SM, SM-SC, SC	A-1, A-2, A-4	0-5	80-100	75-95	45-65	25-40	<30	NP-10
	7-15	Sandy clay loam, loam, sandy loam.	CL, SC	A-2, A-4, A-6	0-5	80-100	75-95	50-90	25-70	20-35	8-15
	15-43	Sandy loam, loam	CL-ML, SM-SC, CL, SC	A-2, A-4, A-6	0-10	80-95	70-95	45-90	25-70	15-30	6-12
	43-72	Loamy sand, sandy loam, loam.	SM-SC, CL-ML, SC	A-1, A-2, A-4	0-10	80-95	70-95	40-90	15-65	<30	NP-10
24B*, 24C*, 24D*: Glenelg---------	0-5	Loam-------------	ML	A-4, A-6	0	90-100	85-100	75-95	50-80	32-40	7-12
	5-20	Channery silt loam, silty clay loam, loam.	GM, ML, SM	A-4, A-6, A-7	0-10	60-100	55-90	50-90	35-85	34-46	9-15
	20-65	Loam, sandy loam, channery loam.	GM, SM, ML	A-1, A-2, A-4	0-50	60-100	15-95	15-90	10-70	<40	NP-6
Buckhall--------	0-7	Loam-------------	CL-ML, CL, SC, SM-SC	A-4, A-6	0-5	85-100	75-95	60-70	45-60	20-35	5-15
	7-12	Loam, sandy clay loam, clay loam.	CL, SC	A-6, A-7	0-5	95-100	75-95	65-85	40-70	20-45	10-25
	12-43	Clay loam, clay	CL	A-6, A-7	0-5	95-100	75-95	65-75	55-70	35-50	15-30
	43-72	Sandy loam, sandy clay loam, clay loam.	CL-ML, CL, SM-SC, SC	A-2, A-4, A-6	0-5	85-95	70-85	40-70	25-60	15-35	5-15
25A---------- Glenville	0-8	Loam-------------	ML, SM	A-4	0	85-100	85-100	70-95	45-80	25-35	3-10
	8-22	Silt loam, channery loam, channery silty clay loam.	CL-ML, CL, GM, SC	A-4, A-6	0-10	70-100	60-100	60-95	45-80	25-40	5-13
	22-32	Silt loam, channery loam, silty clay loam.	CL-ML, CL, GM, SC	A-4, A-6	0-10	65-100	60-100	55-95	45-80	25-40	5-13
	32-72	Channery fine sandy loam, channery loam, very channery sandy loam.	CL-ML, ML, GM, SM	A-4, A-2, A-1	0-20	45-90	20-75	10-75	5-65	25-35	5-10
26A---------- Hatboro	0-14	Silt loam--------	ML, CL, SC, SM	A-4, A-6	0	95-100	90-100	70-100	40-90	22-35	2-12
	14-24	Silt loam, silty clay loam, sandy clay loam.	ML, CL, CL-ML	A-4, A-6	0	85-100	80-100	70-95	55-85	22-35	2-12
	24-48	Sandy clay loam, sandy loam, silt loam.	ML, CL, SC, SM	A-4	0	75-100	70-100	60-90	45-60	22-30	2-10
	48-60	Stratified clay, gravel.	SM, SC, GM, GC	A-1, A-2	0	50-85	45-80	45-80	15-35	<32	NP-14

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
27A*:											
Hatboro	0-14	Silt loam	ML, CL, SC, SM	A-4, A-6	0	95-100	90-100	70-100	40-90	22-35	2-12
	14-24	Silt loam, silty clay loam, sandy clay loam.	ML, CL, CL-ML	A-4, A-6	0	85-100	80-100	70-95	55-85	22-35	2-12
	24-48	Sandy clay loam, sandy loam, silt loam.	ML, CL, SC, SM	A-4	0	75-100	70-100	60-90	45-60	22-30	2-10
	48-60	Stratified clay, gravel.	SM, SC, GM, GC	A-1, A-2	0	50-85	45-80	45-80	15-35	<32	NP-14
Codorus	0-12	Loam	ML, CL, CL-ML	A-4, A-6	0	80-100	70-100	65-100	55-95	22-35	2-12
	12-42	Silt loam, loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0	80-100	75-100	65-100	55-85	22-35	2-12
	42-65	Stratified sand to silt.	SM, GM, ML	A-1, A-2, A-4	0	25-100	20-100	20-85	15-65	<35	NP-7
28B, 28C Haymarket	0-9	Silt loam	CL-ML, CL, SC, SM-SC	A-4, A-6	1-5	95-100	80-100	70-80	45-70	20-35	5-15
	9-13	Silt loam, silty clay loam, clay.	CL, CH	A-6, A-7	1-5	95-100	80-95	75-85	65-80	35-55	20-40
	13-38	Clay	CH	A-7	0-5	95-100	85-95	75-90	65-85	50-75	35-55
	38-46	Silt loam, silty clay loam, clay.	CL, CH	A-6, A-7	1-10	95-100	80-95	75-85	65-80	30-55	15-30
	46-72	Sandy loam, loam, clay loam.	CL-ML, CL, SC, SM-SC	A-4, A-6, A-2	1-10	75-95	65-95	45-85	30-80	20-40	5-20
29B Hoadly	0-11	Loam	CL, CL-ML, SM-SC, SC	A-2, A-4, A-6	0	95-100	75-100	45-75	30-65	<25	NP-15
	11-29	Sandy loam, loam, clay loam.	CL, CL-ML, SM-SC, SC	A-2, A-4, A-6	0	95-100	75-100	45-80	30-70	15-35	5-20
	29-41	Sandy loam, loam, sandy clay loam.	CL, SC	A-2, A-6	0	95-100	75-100	45-75	30-70	25-40	10-25
	41-53	Sandy clay loam, clay loam.	CL, SC	A-6, A-7	0-5	90-100	75-100	60-85	45-75	25-45	15-30
	53-72	Sandy loam, sandy clay loam.	CL, CL-ML, SM-SC, SC	A-2, A-4, A-6	0-5	90-100	75-100	40-75	25-65	<30	NP-15
30B Jackland	0-10	Silt loam	CL	A-6	1-5	95-100	80-100	75-95	51-70	25-40	10-20
	10-15	Silt loam, silty clay loam, clay loam.	CL	A-6, A-7	1-5	95-100	85-95	75-95	55-85	35-50	15-25
	15-38	Clay	CL	A-7	0	99-100	80-100	70-100	55-95	50-75	35-50
	38-60	Clay loam, sandy clay loam, sandy loam.	CL, CL-ML, SC, SM-SC	A-4, A-6	1-5	95-100	65-95	45-90	40-85	20-40	5-20
31B*, 31C*:											
Jackland	0-10	Silt loam	CL	A-6	1-5	95-100	80-100	75-95	51-70	25-40	10-20
	10-15	Silt loam, silty clay loam, clay loam.	CL	A-6, A-7	1-5	95-100	85-95	75-95	55-85	35-50	15-25
	15-38	Clay	CL	A-7	0	99-100	80-100	70-100	55-95	50-75	35-50
	38-60	Clay loam, sandy clay loam, sandy loam.	CL, CL-ML, SC, SM-SC	A-4, A-6	1-5	95-100	65-95	45-90	40-85	20-40	5-20

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
31B*, 31C*:											
Haymarket	0-9	Silt loam	CL-ML, CL, SC, SM-SC	A-4, A-6	1-5	95-100	80-100	70-80	45-70	20-35	5-15
	9-13	Silt loam, silty clay loam, clay.	CL, CH	A-6, A-7	1-5	95-100	80-95	75-85	65-80	35-55	20-40
	13-38	Clay	CH	A-7	0-5	95-100	85-95	75-90	65-85	50-75	35-55
	38-46	Silt loam, silty clay loam, clay.	CL, CH	A-6, A-7	1-10	95-100	80-95	75-85	65-80	30-55	15-30
	46-72	Sandy loam, loam, clay loam.	CL-ML, CL, SC, SM-SC	A-4, A-6, A-2	1-10	75-95	65-95	45-85	30-80	20-40	5-20
32A	0-9	Silt loam	ML	A-4	0	90-100	85-100	80-100	60-90	<30	NP-7
Kelly	9-38	Silty clay loam, clay, sandy clay loam.	CH, CL, SC	A-6, A-7	0	90-100	85-100	70-100	35-95	35-70	14-40
	38-41	Gravelly silty clay, sandy clay loam, clay.	CL, CH, ML, GM-GC	A-2, A-4, A-6, A-7	0-10	45-90	40-90	35-90	15-85	20-60	2-40
	41-45	Weathered bedrock	---	---	---	---	---	---	---	---	---
	45	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
33B*, 33C*, 33D*:											
Legore	0-15	Loam	ML, CL	A-4, A-6	0-15	75-100	50-95	60-90	50-90	<40	7-15
	15-28	Gravelly silty clay loam, clay loam, silty clay loam.	ML, CL, MH, CH	A-7	0-15	80-100	50-95	60-100	55-90	40-65	14-30
	28-72	Gravelly silt loam, silty clay loam, sandy loam.	SM, GM, ML	A-2, A-4, A-6, A-7	0-15	60-100	50-90	40-85	15-75	<50	NP-15
Oakhill	0-8	Gravelly silt loam.	CL-ML, CL, SM-SC, SM	A-4	0-10	80-90	50-75	45-70	35-65	<30	NP-10
	8-25	Very gravelly loam, very gravelly clay loam.	SM-SC, SC	A-1, A-2, A-4, A-6	0-10	75-80	25-50	20-45	15-40	15-40	5-20
	25-34	Very gravelly sandy loam, extremely gravelly sandy loam, very gravelly loam.	SM-SC, SC, GM, GC	A-1, A-2	5-15	60-70	15-50	10-40	5-35	<30	NP-10
	34	Weathered bedrock	---	---	---	---	---	---	---	---	---
34B, 34C, 34D	0-7	Loam	ML, SM	A-2, A-4	0	80-100	75-100	45-95	25-75	20-35	NP-7
Lunt	7-39	Sandy clay, clay loam, clay.	CL, SC, CH	A-7	0	85-100	85-100	75-100	40-80	40-60	25-40
	39-72	Stratified sand and gravel to sand.	SM, SC, SP, GM-GC	A-1, A-2, A-4, A-6	0	45-100	35-95	20-85	2-50	20-45	NP-20
35B	0-10	Silt loam	ML, CL, CL-ML	A-4, A-6	0	90-100	85-100	75-100	55-90	20-34	2-15
Manassas	10-43	Silt loam, silty clay loam, clay loam.	CL, ML	A-6, A-4, A-7	0	90-100	85-100	80-100	60-95	30-45	7-20
	43-60	Very shaly silt loam.	GC, GM-GC	A-2, A-4, A-1, A-6	2-10	45-60	35-50	30-50	20-45	20-35	4-15

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
36D, 36E--------- Marr	0-13	Very fine sandy loam.	ML, CL, SM, SC	A-4	0	100	95-100	90-100	45-65	21-29	1-9
	13-53	Sandy clay loam, fine sandy loam.	ML, CL, SC	A-4, A-6, A-7	0	100	95-100	90-100	40-70	28-45	8-20
	53-72	Fine sandy loam, loamy fine sand.	ML, CL, SM, SC	A-4, A-6	0	100	95-100	80-100	35-65	<39	NP-11
37A---------- Marumsco	0-7	Loam----------	CL	A-6	0	95-100	90-98	75-95	50-75	25-35	10-20
	7-29	Clay loam, clay	CH	A-7	0	95-100	90-98	85-95	65-85	50-75	30-45
	29-47	Sandy clay loam, clay loam, clay.	SC, CL, CH	A-6, A-7	0	95-100	90-98	80-95	45-85	35-75	20-45
	47-75	Stratified sand to clay.	SC, CL, CH, CL-ML	A-2, A-4, A-6, A-7	0-5	90-100	80-95	20-95	5-85	15-75	6-45
38B---------- Meadowville	0-12	Loam----------	ML, CL, CL-ML	A-4	0	90-100	75-100	65-95	50-85	18-32	2-10
	12-31	Loam, silty clay loam, clay loam.	CL, ML	A-4, A-6, A-7	0	90-100	75-100	65-95	50-85	28-50	8-20
	31-39	Sandy clay loam, sandy clay.	SC, CL, MH, CH	A-2, A-6, A-7	0-5	75-95	75-95	60-85	25-55	30-55	10-24
	39-72	Weathered bedrock	---	---	---	---	---	---	---	---	---
39B3, 39C3------- Minnieville	0-8	Clay loam--------	CL	A-4, A-6	0-2	95-100	85-100	80-90	65-80	25-40	9-25
	8-48	Clay loam, silty clay, clay.	CL, CH	A-6, A-7	0-2	95-100	85-100	80-90	65-85	35-60	15-35
	48-58	Clay loam, silty clay loam.	CL	A-4, A-6, A-7	0-5	90-95	75-90	70-85	65-80	30-45	9-25
	58-85	Silty clay loam, loam, gravelly silty clay loam.	CL-ML, CL, SM-SC, SC	A-4, A-6, A-7	0-5	85-90	65-85	55-85	40-80	25-45	6-25
40B, 40C--------- Montalto	0-7	Silty clay loam	ML, CL, CH	A-4, A-6, A-7	0-5	75-100	70-100	60-100	40-95	36-52	10-25
	7-45	Clay, silty clay, clay loam.	CL, CH, MH	A-6, A-7	0-5	75-100	70-100	60-100	50-95	40-54	18-27
	45-62	Loam, clay loam, silty clay loam.	ML, CL, CH	A-6, A-7	0-10	75-100	70-100	60-100	40-95	38-52	13-25
41B, 41C--------- Neabsco	0-8	Loam----------	CL-ML, CL, ML	A-4	0	95-100	85-100	75-85	55-75	<25	NP-10
	8-17	Loam, sandy clay loam, clay loam.	CL, SC	A-6	0	95-100	85-100	70-85	45-65	20-35	10-20
	17-36	Sandy loam, loam, sandy clay loam.	CL-ML, SM-SC, ML, SM	A-2, A-4, A-6	0	95-100	75-95	50-80	30-65	<30	NP-15
	36-52	Loam, clay loam, gravelly clay loam.	CL, SC	A-6	1-5	80-95	50-90	45-70	35-65	20-30	10-15
	52-72	Stratified gravelly sand to clay.	CL-ML, SM-SC, SM, SC	A-1, A-2, A-4, A-6	1-5	75-95	30-90	25-65	15-60	<30	NP-15

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
42B*:											
Neabsco	0-8	Loam	CL-ML, CL, ML	A-4	0	95-100	85-100	75-85	55-75	<25	NP-10
	8-17	Loam, sandy clay loam, clay loam.	CL, SC	A-6	0	95-100	85-100	70-85	45-65	20-35	10-20
	17-36	Sandy loam, loam, sandy clay loam.	CL-ML, SM-SC, ML, SM	A-2, A-4, A-6	0	95-100	75-95	50-80	30-65	<30	NP-15
	36-52	Loam, clay loam, gravelly clay loam.	CL, SC	A-6	1-5	80-95	50-90	45-70	35-65	20-30	10-15
	52-72	Stratified gravelly sand to clay.	CL-ML, SM-SC, SM, SC	A-1, A-2, A-4, A-6	1-5	75-95	30-90	25-65	15-60	<30	NP-15
Quantico	0-13	Loam	CL-ML, SM-SC, CL, SC	A-2, A-4	0-5	90-100	75-95	50-85	25-60	<30	NP-10
	13-18	Clay loam, sandy clay, clay.	CL, SC	A-6, A-7	0-5	90-100	75-95	65-90	45-85	35-50	15-30
	18-47	Clay loam, clay	CL, CH	A-6, A-7	0	95-100	75-95	70-90	60-85	35-65	20-45
	47-72	Sandy loam, sandy clay loam, sandy clay.	CL-ML, SM-SC, CL, SC	A-2, A-4, A-6	0-10	85-95	75-95	50-90	25-85	<35	NP-20
43D, 43E Nestoria	0-8	Gravelly silt loam.	CL-ML, CL, SM-SC, SC	A-2, A-4	0-10	85-100	50-75	45-75	30-65	<30	NP-10
	8-14	Very gravelly loam, very gravelly silt loam, extremely gravelly silt loam.	GW-GC, SW-SC, SM-SC	A-1, A-2, A-4, A-6	5-10	35-75	15-50	14-45	10-40	15-30	6-15
	14-18	Very gravelly loam, very gravelly silt loam, extremely gravelly silt loam.	GW-GC, SW-SC, SM-SC	A-1, A-2, A-4, A-6	10-25	25-75	15-50	14-45	10-40	15-30	6-15
	18-30	Weathered bedrock	---	---	---	---	---	---	---	---	---
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
44D, 44E Occoquan	0-9	Sandy loam	SM-SC, SC, SM	A-2, A-4	1-5	80-100	75-95	45-65	25-40	<25	NP-10
	9-17	Loam, sandy loam, sandy clay loam.	CL, SC	A-6	1-5	80-100	75-95	50-70	40-70	25-40	10-25
	17-53	Loam, sandy loam, loamy sand.	CL-ML, SM-SC, SC, CL	A-2, A-4	2-10	80-95	75-80	50-70	15-65	<25	NP-10
	53	Weathered bedrock	---	---	---	---	---	---	---	---	---
45C Orenda	0-8	Loam	CL-ML, CL	A-4, A-6	0-2	95-100	85-100	75-80	60-80	20-35	6-15
	8-40	Clay loam, clay	CL	A-6, A-7	0-2	95-100	80-100	75-95	65-80	35-50	20-35
	40-66	Sandy clay loam, loam, gravelly sandy clay loam.	CL-ML, CL, SM-SC, SC	A-4, A-6, A-7	0-5	85-90	65-85	55-85	40-80	25-45	6-25
	66	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
46B, 46C--------- Panorama	0-10	Silt loam--------	CL-ML, CL	A-4, A-6	0-5	95-100	90-100	75-95	50-85	20-35	7-15
	10-19	Silty clay loam	CL	A-6, A-7	0-5	90-100	85-100	75-95	70-85	30-45	15-25
	19-38	Silty clay loam, clay loam, silt loam.	CL	A-6, A-7	0-10	85-100	80-95	70-90	65-70	30-50	15-30
	38-55	Channery silt loam, very channery silty clay loam.	CL-ML, SM-SC, SC, CL	A-2, A-4, A-6, A-7	5-15	55-90	35-70	30-65	25-60	20-50	7-25
	55	Weathered bedrock	---	---	---	---	---	---	---	---	---
47B, 47C, 47D---- Quantico	0-13	Sandy loam-------	CL-ML, SM-SC, CL, SC	A-2, A-4	0-5	90-100	75-95	50-85	25-60	<30	NP-10
	13-18	Clay loam, sandy clay, clay.	CL, SC	A-6, A-7	0-5	90-100	75-95	65-90	45-85	35-50	15-30
	18-47	Clay loam, clay	CL, CH	A-6, A-7	0	95-100	75-95	70-90	60-85	35-65	20-45
	47-72	Sandy loam, sandy clay loam, sandy clay.	CL-ML, SM-SC, CL, SC	A-2, A-4, A-6	0-10	85-95	75-95	50-90	25-85	<35	NP-20
48A-------------- Reaville	0-8	Silt loam--------	ML	A-4	0-5	90-100	90-100	85-100	80-95	---	---
	8-18	Silt loam, shaly silt loam, shaly silty clay loam.	CL, GC, SC, CL-ML	A-4, A-6	0-15	65-90	55-85	45-75	40-75	25-39	5-15
	18-31	Shaly silt loam, very shaly silt loam, very shaly loam.	ML, GM, ML, CL-ML	A-2, A-4, A-1-B	0-40	55-80	40-75	30-70	20-65	25-35	5-10
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
49A-------------- Rowland	0-11	Silt loam--------	ML, SM	A-4	0-5	95-100	95-100	75-100	35-95	---	---
	11-28	Silt loam, loam, sandy clay loam.	ML, SM	A-4, A-7, A-6	0-5	95-100	95-100	75-100	35-95	24-45	NP-15
	28-48	Sandy clay, silt loam, gravelly silty clay loam.	ML, SM	A-4, A-6, A-7	0-10	90-100	70-100	65-100	35-95	25-50	3-17
	48-65	Stratified sand to gravel.	SM, GM, GC, SC	A-2, A-1	0-15	55-80	30-70	20-40	15-30	---	---
50D, 50E--------- Spriggs	0-8	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0-2	90-100	85-100	70-95	55-80	15-30	NP-15
	8-18	Silty clay loam, clay loam, loam.	CL	A-6	0-2	90-100	85-100	70-90	60-85	25-40	10-25
	18-32	Sandy loam, loam, gravelly loam.	ML, CL-ML, SM-SC, CL	A-1, A-2, A-4, A-6	5-10	75-90	50-85	30-75	15-65	15-30	NP-15
	32-48	Weathered bedrock	---	---	---	---	---	---	---	---	---
	48	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
51D, 51E--------- Stumptown	0-12	Very flaggy loam	SM-SC, SC, CL-ML, SM	A-2, A-4	50-70	80-95	65-80	50-75	34-70	<30	NP-10
	12-20	Very flaggy loam, very flaggy clay loam.	SC, CL, GC	A-2, A-6	50-70	60-75	60-75	45-70	30-60	20-40	10-25
	20-27	Very flaggy sandy loam, extremely flaggy loam.	SM-SC, SC, GM-GC, GM	A-1, A-2, A-4	50-85	60-75	50-65	30-60	15-45	<30	NP-10
	27-33	Weathered bedrock	---	---	---	---	---	---	---	---	---
	33	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
52B*, 52C*:											
Sudley----------	0-8	Loam----------	CL-ML, CL	A-4, A-6	0-2	90-100	75-95	65-90	50-85	15-30	6-15
	8-42	Loam, clay loam, sandy clay loam.	SC, CL	A-6	0-2	90-100	75-95	60-75	40-70	25-40	10-25
	42-72	Loam, sandy loam, gravelly sandy loam.	SM-SC, SC, CL-ML, CL	A-2, A-4, A-1	5-15	85-95	50-95	35-85	20-60	<30	NP-10
	72	Weathered bedrock	---	---	---	---	---	---	---	---	---
Oatlands--------	0-8	Loam----------	CL-ML, CL, ML	A-4	0-5	90-95	75-95	65-90	50-80	<30	NP-10
	8-19	Gravelly sandy loam, gravelly loam, gravelly clay loam.	GM-GC, GC, SM-SC, SC	A-2, A-6, A-4	0-5	80-90	50-75	45-60	25-40	25-40	10-25
	19-28	Gravelly sandy loam, gravelly loam, very gravelly loam.	SW-SC, SM, SC, SP-SM	A-2, A-6	2-10	60-75	25-50	20-45	15-40	25-35	6-15
	28-36	Extremely gravelly loam.	SW-SC, CL-ML	A-1, A-2	2-15	60-70	15-40	10-35	5-20	<30	NP-10
	36	Unweathered bedrock.									
53B*, 53C*:											
Sycoline--------	0-8	Silt loam--------	CL-ML, CL	A-4, A-6	0-5	90-100	75-100	70-95	65-90	20-35	6-15
	8-17	Silt loam, silty clay loam.	CL	A-6	0-5	90-100	85-100	80-95	70-90	25-40	10-25
	17-28	Silt loam, silty clay loam.	CL	A-6, A-7	0-5	90-100	75-100	65-90	55-75	30-45	15-30
	28-35	Loam, silt loam	CL-ML, CL	A-4, A-6	0-5	90-100	75-100	65-95	55-75	20-35	6-20
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Kelly----------	0-9	Silt loam--------	ML	A-4	0	90-100	85-100	80-100	60-90	<30	NP-7
	9-38	Silty clay loam, clay, sandy clay loam.	CH, CL, SC	A-6, A-7	0	90-100	85-100	70-100	35-95	35-70	14-40
	38-41	Gravelly silty clay, sandy clay loam, clay.	CL, CH, ML, GM-GC	A-2, A-4, A-6, A-7	0-10	45-90	40-90	35-90	15-85	20-60	2-40
	41-45	Weathered bedrock	---	---	---	---	---	---	---	---	---
	45	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
54B*:											
Urban land.											
Udorthents.											
55D, 55E---------	0-7	Channery silt loam.	CL-ML, ML, SM, SM-SC	A-4, A-6	10-20	80-90	50-80	45-75	40-60	15-35	NP-15
Watt	7-16	Channery silt loam, channery silty clay loam.	SM-SC, CL, CL-ML, SC	A-4, A-6	10-20	80-90	50-80	45-80	40-70	20-40	5-20
	16-29	Very channery silt loam, channery silt loam, channery loam.	GM, GM-GC, GC, SM-SC	A-2, A-4, A-6	15-40	60-8	30-55	25-50	20-45	15-35	NP-15
	29	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
56A----------	0-9	Silt loam--------	CL	A-6	0-5	90-100	85-100	75-95	55-85	25-35	10-20
Waxpool	9-12	Clay loam, silty clay loam.	CL	A-6, A-7	0-5	90-100	85-100	80-95	70-80	35-50	20-35
	12-35	Clay----------	CH	A-7	0-5	95-100	90-100	85-95	80-90	50-75	35-55
	35-43	Loam, clay loam, silty clay loam.	CL	A-6, A-7	0-5	80-95	75-95	65-90	50-70	25-45	10-30
	43-72	Sandy loam, loamy sand.	SM, SM-SC, SC	A-1, A-2	0-10	80-95	70-95	35-50	15-35	<25	NP-15

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
1A----------	0-8	10-27	1.30-1.40	0.6-2.0	0.20-0.24	4.5-5.5	Low----------	0.43	5	.5-2
Aden	8-31	35-60	1.45-1.60	0.06-0.2	0.10-0.14	4.5-5.5	Moderate-----	0.28		
	31-58	27-50	1.50-1.65	0.06-0.2	0.10-0.14	4.5-5.5	Moderate-----	0.28		
	58-78	10-27	1.55-1.70	0.6-2.0	0.12-0.20	4.5-5.5	Low----------	0.32		
	78	---	---	---	---	---	----------	----		
2B*, 2C*, 2D*, 2E*:										
Airmont--------	0-11	5-15	1.00-1.20	2.0-6.0	0.08-0.10	4.5-5.5	Low----------	0.10	4	2-4
	11-27	20-35	1.20-1.50	2.0-6.0	0.08-0.10	4.5-5.5	Low----------	0.10		
	27-45	10-27	1.70-1.90	0.06-0.2	0.04-0.08	4.5-5.5	Low----------	0.10		
	45-65	10-35	1.20-1.50	0.6-6.0	0.04-0.08	4.5-5.5	Low----------	0.05		
Weverton-------	0-7	5-15	1.00-1.20	2.0-6.0	0.10-0.17	4.5-5.5	Low----------	0.15	4	.5-2
	7-38	20-35	1.20-1.50	0.6-2.0	0.04-0.08	4.5-5.5	Low----------	0.10		
	38-52	10-27	1.20-1.50	0.6-2.0	0.02-0.06	4.5-5.5	Low----------	0.05		
	52	---	---	---	---	---	----------	----		
3A----------	0-7	7-27	1.25-1.55	0.6-2.0	0.14-0.20	4.5-6.0	Low----------	0.37	3	1-2
Albano	7-28	35-60	1.35-1.65	0.06-0.2	0.11-0.18	4.5-7.3	Moderate-----	0.32		
	28-40	20-40	1.35-1.65	0.06-0.6	0.05-0.10	5.6-7.3	Low----------	0.17		
	40	---	---	---	---	---	----------	----		
4B----------	0-9	15-27	1.20-1.50	0.6-2.0	0.14-0.22	4.5-5.5	Low----------	0.37	2	.5-2
Arcola	9-22	18-35	1.30-1.50	0.6-2.0	0.10-0.18	4.5-5.5	Low----------	0.24		
	22-28	15-27	1.20-1.50	0.6-2.0	0.04-0.08	4.5-5.5	Low----------	0.15		
	28	---	---	---	---	---	----------	----		
5C*, 5D*:										
Arcola----------	0-9	15-27	1.20-1.50	0.6-2.0	0.14-0.22	4.5-5.5	Low----------	0.37	2	.5-2
	9-22	18-35	1.30-1.50	0.6-2.0	0.10-0.18	4.5-5.5	Low----------	0.24		
	22-28	15-27	1.20-1.50	0.6-2.0	0.04-0.08	4.5-5.5	Low----------	0.15		
	28	---	---	---	---	---	----------	----		
Nestoria--------	0-8	10-27	1.40-1.60	0.6-2.0	0.10-0.16	4.5-6.0	Low----------	0.28	1	.5-2
	8-14	15-27	1.35-1.55	0.6-2.0	0.04-0.10	4.5-6.0	Low----------	0.10		
	14-18	10-27	1.35-1.55	0.6-2.0	0.04-0.10	4.5-6.0	Low----------	0.05		
	18-30	---	---	---	---	---	----------	----		
	30	---	---	---	---	---	----------	----		
6A----------	0-8	15-32	1.20-1.40	0.2-0.6	0.16-0.27	4.1-5.5	Low----------	0.43	3	1-4
Baile	8-45	10-35	1.30-1.60	0.06-0.2	0.12-0.24	4.1-5.5	Moderate-----	0.43		
	45-62	10-25	1.30-1.60	0.06-0.6	0.10-0.24	4.1-5.5	Low----------	0.43		
7A----------	0-12	10-25	1.25-1.40	0.6-6.0	0.12-0.16	4.5-6.0	Low----------	0.37	4	2-3
Bermudian	12-38	17-35	1.30-1.50	0.6-6.0	0.12-0.16	4.5-6.0	Low----------	0.28		
	38-64	5-20	1.35-1.55	6.0-20.0	0.04-0.08	4.5-6.0	Low----------	0.17		
8C----------	0-8	10-25	1.20-1.50	0.6-6.0	0.14-0.19	3.6-5.5	Low----------	0.32	4	1-2
Braddock	8-55	35-55	1.20-1.50	0.6-2.0	0.12-0.17	3.6-5.5	Moderate-----	0.24		
	55-69	25-45	1.20-1.50	0.6-6.0	0.06-0.12	3.6-5.5	Low----------	0.24		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
9B, 9C----------	0-11	5-15	1.40-1.60	0.6-2.0	0.10-0.14	3.6-5.5	Low----------	0.28	2	.5-2
Brentsville	11-26	10-18	1.40-1.60	0.6-2.0	0.10-0.18	3.6-5.5	Low----------	0.15		
	26-34	5-15	1.40-1.60	0.6-2.0	0.10-0.18	3.6-5.5	Low----------	0.15		
	34-38	---	---	---	---	---	----------	----		
	38	---	---	---	---	---	----------	----		
10B, 10C---------	0-7	10-27	1.20-1.50	2.0-6.0	0.16-0.22	4.5-5.5	Low----------	0.32	4	.5-2
Buckhall	7-12	15-40	1.25-1.45	0.6-2.0	0.12-0.16	4.5-5.5	Low----------	0.24		
	12-43	35-60	1.25-1.45	0.6-2.0	0.10-0.14	4.5-5.5	Moderate-----	0.20		
	43-72	10-40	1.20-1.50	0.6-2.0	0.10-0.16	4.5-5.5	Low----------	0.24		
11B----------	0-10	10-27	1.20-1.50	0.6-2.0	0.17-0.20	3.6-5.5	Low----------	0.43	3	.5-2
Calverton	10-19	18-35	1.35-1.60	0.2-2.0	0.16-0.20	3.6-5.5	Moderate-----	0.43		
	19-29	18-35	1.70-1.90	<0.2	0.04-0.08	3.6-5.5	Moderate-----	0.43		
	29-55	10-45	1.50-1.70	<2.0	0.04-0.10	3.6-5.5	Low----------	0.32		
	55	---	---	---	---	---	----------	----		
12D----------	0-6	7-25	1.30-1.50	2.0-6.0	0.10-0.16	4.5-5.5	Low----------	0.20	2	.5-2
Catlett	6-12	7-25	1.30-1.50	0.6-2.0	0.04-0.08	4.5-5.5	Low----------	0.10		
	12-17	7-25	1.30-1.50	0.6-2.0	0.04-0.08	4.5-5.5	Low----------	0.10		
	17	---	---	---	---	---	----------	----		
13B*:										
Catlett---------	0-6	7-25	1.30-1.50	2.0-6.0	0.10-0.16	4.5-5.5	Low----------	0.20	2	.5-2
	6-12	7-25	1.30-1.50	0.6-2.0	0.04-0.08	4.5-5.5	Low----------	0.10		
	12-17	7-25	1.30-1.50	0.6-2.0	0.04-0.08	4.5-5.5	Low----------	0.10		
	17	---	---	---	---	---	----------	----		
Sycoline--------	0-9	15-27	1.35-1.55	0.2-0.6	0.17-0.22	4.5-5.5	Low----------	0.43	2	1-2
	9-22	18-35	1.35-1.55	0.2-0.6	0.10-0.18	4.5-5.5	Low----------	0.37		
	22-26	25-40	1.35-1.50	<0.06	0.12-0.15	4.5-5.5	Moderate-----	0.43		
	26-33	15-27	1.35-1.55	<0.06	0.10-0.18	4.5-5.5	Moderate-----	0.43		
	33	---	---	---	---	---	----------	----		
13C*:										
Catlett---------	0-6	7-25	1.30-1.50	2.0-6.0	0.10-0.16	4.5-5.5	Low----------	0.20	2	.5-2
	6-12	7-25	1.30-1.50	0.6-2.0	0.04-0.08	4.5-5.5	Low----------	0.10		
	12-17	7-25	1.30-1.50	0.6-2.0	0.04-0.08	4.5-5.5	Low----------	0.10		
	17	---	---	---	---	---	----------	----		
Sycoline--------	0-9	15-27	1.35-1.55	0.2-0.6	0.17-0.22	4.5-5.5	Low----------	0.43	2	1-2
	9-22	18-35	1.35-1.55	0.2-0.6	0.10-0.18	4.5-5.5	Low----------	0.37		
	22-26	25-40	1.35-1.50	<0.06	0.12-0.15	4.5-5.5	Moderate-----	0.43		
	26-33	15-27	1.35-1.55	<0.06	0.10-0.18	4.5-5.5	Moderate-----	0.43		
	33	---	---	---	---	---	----------	----		
14A----------	0-12	15-25	1.20-1.40	0.6-2.0	0.14-0.20	4.5-6.0	Low----------	0.49	4	2-4
Codorus	12-42	18-35	1.20-1.50	0.6-2.0	0.14-0.18	5.1-6.5	Low----------	0.37		
	42-65	5-12	1.20-1.50	2.0-20	0.04-0.08	5.1-6.5	Low----------	0.24		
15A----------	0-39	5-18	1.20-1.40	0.6-2.0	0.13-0.21	4.5-6.0	Low----------	0.43	3	1-3
Comus	39-70	5-34	1.30-1.60	0.6-6.0	0.07-0.21	4.5-6.0	Low----------	0.28		
16A----------	0-11	5-20	1.20-1.50	0.6-2.0	0.18-0.24	3.6-5.5	Low----------	0.37	4	2-4
Delanco	11-45	18-30	1.35-1.65	0.2-0.6	0.18-0.24	3.6-5.5	Moderate-----	0.32		
	45-76	5-25	1.35-1.65	0.6-2.0	0.15-0.22	3.6-5.5	Low----------	0.28		
17A----------	0-8	10-25	1.20-1.50	0.6-2.0	0.19-0.22	4.5-6.0	Low----------	0.43	3	.5-2
Dulles	8-34	27-45	1.20-1.50	0.06-0.2	0.12-0.15	4.5-6.0	High---------	0.43		
	34-43	40-60	1.30-1.60	<0.06	0.08-0.14	4.5-6.0	High---------	0.28		
	43	---	---	---	---	---	----------	----		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
18C, 18D, 18E----	0-10	5-20	1.00-1.30	2.0-6.0	0.08-0.14	4.5-5.5	Low----------	0.28	4	.5-1
Dumfries	10-29	18-35	1.20-1.50	2.0-6.0	0.10-0.18	4.5-5.5	Low----------	0.28		
	29-35	5-25	1.20-1.50	2.0-6.0	0.08-0.16	4.5-5.5	Low----------	0.28		
	35-72	5-20	1.20-1.50	2.0-6.0	0.08-0.12	4.5-5.5	Low----------	0.24		
19B, 19C---------	0-5	10-25	1.20-1.30	0.6-2.0	0.12-0.24	4.5-6.0	Low----------	0.32	4	.5-2
Elioak	5-41	35-55	1.35-1.65	0.6-2.0	0.08-0.12	4.5-5.5	Low----------	0.49		
	41-72	20-27	1.20-1.50	---	---	---	----------	----		
20B----------	0-9	10-25	1.20-1.50	0.6-2.0	0.10-0.18	4.5-5.5	Low----------	0.37	4	.5-2
Elsinboro	9-44	20-35	1.35-1.65	0.6-2.0	0.12-0.16	4.5-5.5	Low----------	0.28		
	44-65	20-30	1.35-1.65	0.6-6.0	0.06-0.14	4.5-5.5	Low----------	0.17		
21B, 21C---------	0-8	10-20	1.20-1.50	2.0-6.0	0.14-0.20	4.5-5.0	Low----------	0.43	4	1-2
Fairfax	8-14	28-35	1.20-1.50	0.6-2.0	0.16-0.19	4.5-5.0	Moderate-----	0.43		
	14-60	35-50	1.35-1.65	0.6-2.0	0.12-0.16	4.5-5.0	Moderate-----	0.28		
	60-75	10-35	1.20-1.50	0.6-2.0	0.14-0.20	4.5-5.0	Low----------	0.43		
22A----------	0-14	10-27	0.50-0.80	0.6-2.0	0.18-0.24	4.5-5.5	Low----------	0.49	5	10-30
Featherstone	14-72	10-27	0.50-0.90	0.6-2.0	0.18-0.24	4.5-5.5	Low----------	0.49		
23C----------	0-7	10-25	1.20-1.40	0.6-2.0	0.14-0.20	3.6-5.5	Low----------	0.37	5	.5-2
Gaila	7-15	18-30	1.30-1.50	0.6-2.0	0.10-0.18	3.6-5.5	Low----------	0.32		
	15-43	10-25	1.25-1.50	2.0-6.0	0.10-0.16	3.6-5.5	Low----------	0.28		
	43-72	5-20	1.25-1.50	2.0-6.0	0.08-0.14	3.6-5.5	Low----------	0.24		
23D, 23E---------	0-7	5-20	1.20-1.40	2.0-6.0	0.10-0.12	3.6-5.5	Low----------	0.28	5	.5-2
Gaila	7-15	18-30	1.30-1.50	0.6-2.0	0.10-0.18	3.6-5.5	Low----------	0.32		
	15-43	10-25	1.25-1.50	2.0-6.0	0.10-0.16	3.6-5.5	Low----------	0.28		
	43-72	5-20	1.25-1.50	2.0-6.0	0.08-0.14	3.6-5.5	Low----------	0.24		
24B*, 24C*, 24D*:										
Glenelg----------	0-5	15-25	1.20-1.40	0.6-2.0	0.14-0.24	4.5-5.5	Low----------	0.32	3	1-3
	5-20	20-32	1.40-1.60	0.6-2.0	0.10-0.20	4.5-5.5	Low----------	0.43		
	20-65	5-20	1.40-1.60	0.6-2.0	0.10-0.19	4.5-5.5	Low----------	0.49		
Buckhall---------	0-7	10-27	1.20-1.50	2.0-6.0	0.16-0.22	4.5-5.5	Low----------	0.32	4	.5-2
	7-12	15-40	1.25-1.45	0.6-2.0	0.12-0.16	4.5-5.5	Low----------	0.24		
	12-43	35-60	1.25-1.45	0.6-2.0	0.10-0.14	4.5-5.5	Moderate-----	0.20		
	43-72	10-40	1.20-1.50	0.6-2.0	0.10-0.16	4.5-5.5	Low----------	0.24		
25A----------	0-8	10-20	1.20-1.40	0.6-2.0	0.16-0.20	4.5-7.3	Low----------	0.32	3	1-3
Glenville	8-22	20-35	1.40-1.60	0.6-2.0	0.12-0.16	4.5-6.0	Low----------	0.24		
	22-32	20-35	1.60-1.80	0.06-0.6	0.08-0.12	4.5-6.0	Low----------	0.24		
	32-72	5-25	1.40-1.60	0.2-0.6	0.06-0.12	4.5-5.5	Low----------	0.24		
26A----------	0-14	10-20	1.20-1.40	0.6-2.0	0.16-0.22	4.5-7.3	Low----------	0.49	4	1-4
Hatboro	14-24	15-35	1.20-1.40	0.6-2.0	0.16-0.20	4.5-7.3	Low----------	0.32		
	24-48	10-35	1.20-1.50	0.6-2.0	0.10-0.14	5.6-6.5	Low----------	0.20		
	48-60	5-45	1.10-1.60	2.0-6.0	0.04-0.08	5.6-6.5	Low----------	0.20		
27A*:										
Hatboro----------	0-14	10-20	1.20-1.40	0.6-2.0	0.16-0.22	4.5-7.3	Low----------	0.49	4	1-4
	14-24	15-35	1.20-1.40	0.6-2.0	0.16-0.20	4.5-7.3	Low----------	0.32		
	24-48	10-35	1.20-1.50	0.6-2.0	0.10-0.14	5.6-6.5	Low----------	0.20		
	48-60	5-45	1.10-1.60	2.0-6.0	0.04-0.08	5.6-6.5	Low----------	0.20		
Codorus----------	0-12	15-25	1.20-1.40	0.6-2.0	0.14-0.20	4.5-6.0	Low----------	0.49	4	2-4
	12-42	18-35	1.20-1.50	0.6-2.0	0.14-0.18	5.1-6.5	Low----------	0.37		
	42-65	5-12	1.20-1.50	2.0-20	0.04-0.08	5.1-6.5	Low----------	0.24		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
28B, 28C---------	0-9	10-27	1.00-1.30	0.6-2.0	0.18-0.22	4.5-6.0	Low----------	0.32	4	1-3
Haymarket	9-13	25-45	1.20-1.50	0.2-0.6	0.10-0.16	4.5-6.0	Moderate-----	0.28		
	13-38	40-60	1.20-1.50	0.2-0.6	0.08-0.12	4.5-6.0	High---------	0.10		
	38-46	25-45	1.20-1.50	0.2-0.6	0.10-0.16	4.5-6.0	Moderate-----	0.28		
	46-72	15-35	1.30-1.60	0.6-2.0	0.10-0.20	5.6-7.8	Low----------	0.28		
29B---------------	0-11	10-27	1.00-1.30	0.6-6.0	0.12-0.20	4.5-6.5	Low----------	0.28	4	1-3
Hoadly	11-29	18-35	1.20-1.50	0.6-2.0	0.10-0.18	4.5-6.5	Low----------	0.28		
	29-41	18-35	1.70-1.90	<0.06	0.08-0.10	4.5-6.5	Low----------	0.28		
	41-53	20-40	1.30-1.60	0.6-2.0	0.10-0.18	4.5-6.5	Moderate-----	0.24		
	53-72	10-35	1.30-1.60	0.6-2.0	0.10-0.18	4.5-6.5	Low----------	0.24		
30B---------------	0-10	15-27	1.00-1.30	0.6-2.0	0.16-0.22	4.5-6.0	Low----------	0.32	4	.5-2
Jackland	10-15	20-40	1.20-1.50	0.06-0.2	0.10-0.16	4.5-6.0	High---------	0.28		
	15-38	40-60	1.20-1.50	<0.06	0.08-0.12	4.5-7.,	Very high----	0.10		
	38-60	10-40	1.30-1.60	0.6-2.0	0.10-0.14	4.5-7.8	Low----------	0.15		
31B*, 31C*:										
Jackland---------	0-10	15-27	1.00-1.30	0.6-2.0	0.16-0.22	4.5-6.0	Low----------	0.32	4	.5-2
	10-15	20-40	1.20-1.50	0.06-0.2	0.10-0.16	4.5-6.0	High---------	0.28		
	15-38	40-60	1.20-1.50	<0.06	0.08-0.12	4.5-7.,	Very high----	0.10		
	38-60	10-40	1.30-1.60	0.6-2.0	0.10-0.14	4.5-7.8	Low----------	0.15		
Haymarket--------	0-9	10-27	1.00-1.30	0.6-2.0	0.18-0.22	4.5-6.0	Low----------	0.32	4	1-3
	9-13	25-45	1.20-1.50	0.2-0.6	0.10-0.16	4.5-6.0	Moderate-----	0.28		
	13-38	40-60	1.20-1.50	0.2-0.6	0.08-0.12	4.5-6.0	High---------	0.10		
	38-46	25-45	1.20-1.50	0.2-0.6	0.10-0.16	4.5-6.0	Moderate-----	0.28		
	46-72	15-35	1.30-1.60	0.6-2.0	0.10-0.20	5.6-7.8	Low----------	0.28		
32A---------------	0-9	10-27	1.20-1.40	0.6-2.0	0.13-0.21	4.5-6.0	Low----------	0.37	3	.5-2
Kelly	9-38	35-60	1.20-1.40	<0.2	0.11-0.21	6.1-7.3	High---------	0.28		
	38-41	20-50	1.30-1.60	0.06-2.0	0.11-0.21	6.1-7.3	High---------	0.24		
	41-45	---	---	---	---	---	----------	----		
	45	---	---	---	---	---	----------	----		
33B*, 33C*, 33D*:										
Legore-----------	0-15	---	---	0.6-6.0	0.12-0.24	5.1-6.0	Low----------	0.24	3	.5-2
	15-28	---	---	0.6-2.0	0.12-0.24	5.6-6.5	Moderate-----	0.17		
	28-72	---	---	0.6-6.0	0.08-0.12	5.6-6.5	Low----------	0.28		
Oakhill----------	0-8	10-27	1.30-1.60	2.0-6.0	0.10-0.16	4.5-5.5	Low----------	0.20	3	.5-2
	8-25	10-35	1.35-1.65	0.6-2.0	0.04-0.10	5.6-7.3	Low----------	0.10		
	25-34	5-27	1.30-1.60	0.6-2.0	0.02-0.10	5.6-7.3	Low----------	0.10		
	34	---	---	---	---	---	----------	----		
34B, 34C, 34D-----	0-7	10-27	1.20-1.55	0.6-6.0	0.08-0.17	4.5-5.5	Low----------	0.32	4	.5-2
Lunt	7-39	35-60	1.30-1.60	0.6-2.0	0.13-0.19	4.5-5.5	High---------	0.32		
	39-72	5-30	1.45-1.65	>2.0	0.04-0.12	4.5-5.5	Low----------	0.17		
35B---------------	0-10	10-27	1.25-1.55	0.6-6.0	0.14-0.20	4.5-5.5	Low----------	0.37	4	2-4
Manassas	10-43	20-35	1.30-1.60	0.6-6.0	0.16-0.20	4.5-5.5	Low----------	0.24		
	43-60	15-30	1.30-1.60	0.6-6.0	0.06-0.10	4.5-5.5	Low----------	0.20		
36D, 36E----------	0-13	16-23	1.40-1.60	2.0-6.0	0.14-0.20	5.1-5.5	Low----------	0.32	3	.5-3
Marr	13-53	18-35	1.40-1.70	0.6-2.0	0.16-0.24	4.5-5.5	Low----------	0.28		
	53-72	12-20	1.40-1.60	2.0-6.0	0.10-0.18	4.5-5.5	Low----------	0.37		
37A---------------	0-7	15-27	1.20-1.50	0.6-2.0	0.16-0.22	3.6-5.0	Moderate-----	0.32	5	1-2
Marumsco	7-29	35-60	1.10-1.30	0.06-0.2	0.10-0.14	3.6-5.0	High---------	0.20		
	29-47	25-55	1.10-1.40	0.2-0.6	0.10-0.16	3.6-5.0	High---------	0.20		
	47-75	5-50	1.20-1.50	0.06-20	0.06-0.16	3.6-5.0	High---------	0.24		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
38B----------	0-12	10-27	1.00-1.25	2.0-6.0	0.17-0.20	4.5-6.0	Low----------	0.37	3	2-4
Meadowville	12-31	20-35	1.20-1.50	0.6-6.0	0.14-0.19	4.5-6.0	Moderate-----	0.28		
	31-39	20-50	1.20-1.50	0.6-6.0	0.11-0.17	4.5-6.0	Moderate-----	0.28		
	39-72	---	---	---	---	---	----------	---		
39B3, 39C3-------	0-8	27-40	1.45-1.55	0.6-2.0	0.10-0.14	5.1-6.0	Moderate-----	0.28	5	.5-1
Minnieville	8-48	35-70	1.25-1.45	0.6-2.0	0.10-0.14	5.1-6.0	Moderate-----	0.24		
	48-58	30-40	1.25-1.45	0.6-2.0	0.10-0.12	5.1-6.0	Moderate-----	0.24		
	58-85	25-40	1.45-1.65	0.6-2.0	0.08-0.16	5.1-6.0	Low----------	0.32		
40B, 40C----------	0-7	18-35	1.40-1.70	0.6-6.0	0.16-0.21	4.5-6.5	Low----------	0.32	4	1-3
Montalto	7-45	30-55	1.60-1.90	0.2-0.6	0.14-0.21	5.1-6.5	High---------	0.28		
	45-62	20-40	1.60-1.80	0.6-2.0	0.14-0.21	5.1-6.5	Moderate-----	0.28		
41B, 41C----------	0-8	10-27	1.00-1.25	0.6-2.0	0.18-0.24	4.5-5.5	Low----------	0.32	3	1-3
Neabsco	8-17	18-35	1.20-1.30	0.6-2.0	0.14-0.24	4.5-5.5	Low----------	0.24		
	17-36	15-35	1.70-1.90	<0.06	0.10-0.14	4.5-5.5	Low----------	0.24		
	36-52	15-35	1.20-1.50	0.6-2.0	0.10-0.14	4.5-5.5	Low----------	0.24		
	52-72	10-50	1.20-1.50	0.6-6.0	0.08-0.12	4.5-5.5	Low----------	0.20		
42B*:										
Neabsco----------	0-8	10-27	1.00-1.25	0.6-2.0	0.18-0.24	4.5-5.5	Low----------	0.32	3	1-3
	8-17	18-35	1.20-1.30	0.6-2.0	0.14-0.24	4.5-5.5	Low----------	0.24		
	17-36	15-35	1.70-1.90	<0.06	0.10-0.14	4.5-5.5	Low----------	0.24		
	36-52	15-35	1.20-1.50	0.6-2.0	0.10-0.14	4.5-5.5	Low----------	0.24		
	52-72	10-50	1.20-1.50	0.6-6.0	0.08-0.12	4.5-5.5	Low----------	0.20		
Quantico---------	0-13	10-27	1.00-1.30	2.0-6.0	0.10-0.22	4.5-5.5	Low----------	0.32	4	1-3
	13-18	35-45	1.30-1.55	0.6-2.0	0.12-0.18	4.5-5.5	Moderate-----	0.24		
	18-47	35-60	1.35-1.60	0.6-2.0	0.10-0.14	4.5-5.5	Moderate-----	0.20		
	47-72	10-50	1.25-1.55	0.6-6.0	0.08-0.18	4.5-5.5	Moderate-----	0.20		
43D, 43E----------	0-8	10-27	1.40-1.60	0.6-2.0	0.10-0.16	4.5-6.0	Low----------	0.28	1	.5-2
Nestoria	8-14	15-27	1.35-1.55	0.6-2.0	0.04-0.10	4.5-6.0	Low----------	0.10		
	14-18	10-27	1.35-1.55	0.6-2.0	0.04-0.10	4.5-6.0	Low----------	0.05		
	18-30	---	---	---	---	---	----------	---		
	30	---	---	---	---	---	----------	---		
44D, 44E----------	0-9	5-20	1.20-1.50	2.0-6.0	0.08-0.10	3.6-5.5	Low----------	0.24	3	.5-2
Occoquan	9-17	18-35	1.30-1.60	0.6-6.0	0.10-0.14	3.6-5.5	Low----------	0.32		
	17-53	5-27	1.20-1.50	2.0-6.0	0.07-0.10	3.6-5.5	Low----------	0.24		
	53	---	---	---	---	---	----------	---		
45C----------	0-8	10-27	1.25-1.35	0.6-2.0	0.18-0.22	5.1-6.0	Low----------	0.37	5	1-2
Orenda	8-40	35-60	1.25-1.45	0.2-0.6	0.10-0.14	5.1-6.0	Moderate-----	0.24		
	40-66	20-35	1.45-1.65	0.6-2.0	0.08-0.16	5.1-6.0	Low----------	0.32		
	66	---	---	---	---	---	----------	---		
46B, 46C----------	0-10	10-27	1.30-1.50	0.6-2.0	0.18-0.24	4.5-5.5	Low----------	0.37	4	.1-2
Panorama	10-19	27-35	1.30-1.50	0.6-2.0	0.12-0.16	4.5-5.5	Low----------	0.32		
	19-38	27-40	1.40-1.60	0.6-2.0	0.10-0.14	4.5-5.5	Moderate-----	0.32		
	38-55	20-40	1.40-1.60	0.6-2.0	0.06-0.10	4.5-5.5	Low----------	0.17		
	55	---	---	---	---	---	----------	---		
47B, 47C, 47D----	0-13	10-27	1.00-1.30	2.0-6.0	0.10-0.22	4.5-5.5	Low----------	0.32	4	1-3
Quantico	13-18	35-45	1.30-1.55	0.6-2.0	0.12-0.18	4.5-5.5	Moderate-----	0.24		
	18-47	35-60	1.35-1.60	0.6-2.0	0.10-0.14	4.5-5.5	Moderate-----	0.20		
	47-72	10-50	1.25-1.55	0.6-6.0	0.08-0.18	4.5-5.5	Moderate-----	0.20		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
48A----------	0-8	15-22	1.20-1.40	0.6-2.0	0.16-0.20	5.1-6.5	Low----------	0.43	2-1	1-4
Reaville	8-18	18-32	1.30-1.60	0.06-0.2	0.08-0.14	5.1-6.5	Low----------	0.28		
	18-31	15-24	1.30-1.70	0.06-0.2	0.06-0.12	5.1-6.5	Low----------	0.28		
	31	---	---	---	---	---	----------	----		
49A----------	0-11	10-20	1.10-1.30	0.2-2.0	0.14-0.18	4.5-6.0	Low----------	0.43	4	2-4
Rowland	11-28	15-32	1.20-1.50	0.2-2.0	0.14-0.18	4.5-6.0	Low----------	0.28		
	28-48	15-32	1.20-1.50	0.2-2.0	0.12-0.16	4.5-6.0	Low----------	0.28		
	48-65	3-12	1.40-1.70	2.0-6.0	0.03-0.08	4.5-6.0	Low----------	0.17		
50D, 50E----------	0-8	10-27	1.30-1.40	0.6-2.0	0.18-0.24	4.5-6.0	Low----------	0.37	3	.5-2
Spriggs	8-18	20-35	1.33-1.40	0.6-2.0	0.12-0.20	4.5-6.0	Moderate-----	0.37		
	18-32	15-27	1.40-1.50	0.6-2.0	0.08-0.18	4.5-6.0	Low----------	0.24		
	32-48	---	---	---	---	---	----------	----		
	48	---	---	---	---	---	----------	----		
51D, 51E----------	0-12	10-27	1.20-1.50	2.0-6.0	0.06-0.10	4.5-5.5	Low----------	0.20	2	.5-2
Stumptown	12-20	15-35	1.30-1.60	2.0-6.0	0.02-0.10	4.5-5.5	Low----------	0.10		
	20-27	10-27	1.30-1.60	2.0-6.0	0.02-0.10	4.5-5.5	Low----------	0.10		
	27-33	---	---	---	---	---	----------	----		
	33	---	---	---	---	---	----------	----		
52B*, 52C*:										
Sudley----------	0-8	10-27	1.30-1.45	0.6-2.0	0.16-0.22	4.5-6.0	Low----------	0.37	4	.5-2
	8-42	18-35	1.30-1.60	0.6-2.0	0.12-0.18	4.5-6.0	Moderate-----	0.28		
	42-72	5-20	1.30-1.60	0.6-2.0	0.08-0.14	4.5-6.0	Low----------	0.28		
	72	---	---	---	---	---	----------	----		
Oatlands--------	0-8	10-27	1.20-1.50	2.0-6.0	0.17-0.20	4.5-6.0	Low----------	0.32	2	.5-2
	8-19	18-35	1.30-1.60	0.6-2.0	0.07-0.10	4.5-6.0	Moderate-----	0.24		
	19-28	15-27	1.30-1.60	0.6-2.0	0.05-0.10	4.5-6.0	Moderate-----	0.10		
	28-36	10-27	1.30-1.60	2.0-6.0	0.04-0.08	4.5-6.0	Low----------	0.10		
	36	---	---	---	---	---	----------	----		
53B*, 53C*:										
Sycoline--------	0-8	15-27	1.35-1.55	0.2-0.6	0.17-0.22	4.5-5.5	Low----------	0.43	2	1-2
	8-17	18-35	1.35-1.55	0.2-0.6	0.10-0.18	4.5-5.5	Low----------	0.37		
	17-28	25-40	1.35-1.50	<0.06	0.12-0.15	4.5-5.5	Moderate-----	0.43		
	28-35	15-27	1.35-1.55	<0.06	0.10-0.18	4.5-5.5	Moderate-----	0.43		
	35	---	---	---	---	---	----------	----		
Kelly----------	0-9	10-27	1.20-1.40	0.6-2.0	0.13-0.21	4.5-6.0	Low----------	0.37	3	.5-2
	9-38	35-60	1.20-1.40	<0.2	0.11-0.21	6.1-7.3	High---------	0.28		
	38-41	20-50	1.30-1.60	0.06-2.0	0.11-0.21	6.1-7.3	High---------	0.24		
	41-45	---	---	---	---	---	----------	----		
	45	---	---	---	---	---	----------	----		
54B*:										
Urban land.										
Udorthents.										
55D, 55E----------	0-7	10-27	1.30-1.60	2.0-6.0	0.08-0.12	3.6-5.5	Low----------	0.32	2	.5-2
Watt	7-16	18-32	1.35-1.65	2.0-6.0	0.08-0.12	3.6-5.5	Low----------	0.24		
	16-29	5-27	1.35-1.65	2.0-6.0	0.04-0.08	3.6-5.5	Low----------	0.20		
	29	---	---	---	---	---	----------	----		
56A----------	0-9	15-27	1.00-1.30	0.6-2.0	0.20-0.24	4.5-6.0	Low----------	0.43	4	1-3
Waxpool	9-12	27-40	1.25-1.45	0.2-0.6	0.12-0.16	4.5-7.3	High---------	0.28		
	12-35	40-60	1.35-1.55	<0.06	0.10-0.12	4.5-7.3	High---------	0.15		
	35-43	20-40	1.25-1.55	0.06-0.6	0.12-0.16	4.5-8.4	High---------	0.28		
	43-72	5-20	1.30-1.60	2.0-6.0	0.08-0.12	6.6-8.4	Low----------	0.20		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
1A---------- Aden	C	Occasional	Long------	Dec-Mar	0-1.0	Perched	Dec-Mar	>60	---	High-----	High-----	High.
2B*, 2C*, 2D*, 2E*:												
Airmont---------	C	None--------	---	---	1.5-3.0	Perched	Jan-Mar	>60	---	Moderate	Moderate	High.
Weverton--------	B	None--------	---	---	>6.0	---	---	40-60	Soft	Moderate	Moderate	Moderate.
3A---------- Albano	D	None--------	---	---	0-1.5	Apparent	Nov-Mar	40-60	Hard	High-----	High-----	Moderate.
4B---------- Arcola	C	None--------	---	---	>6.0	---	---	20-40	Soft	Moderate	Moderate	Moderate.
5C*, 5D*:												
Arcola----------	C	None--------	---	---	>6.0	---	---	20-40	Soft	Moderate	Moderate	Moderate.
Nestoria---------	C/D	None--------	---	---	>6.0	---	---	10-20	Soft	Moderate	Moderate	Moderate.
6A---------- Baile	D	None--------	---	---	0-0.5	Apparent	Nov-Apr	>60	---	High-----	High-----	High.
7A---------- Bermudian	B	Occasional	Brief-----	Nov-Apr	3.0-6.0	Apparent	Nov-Mar	>60	---	Moderate	Low------	Moderate.
8C---------- Braddock	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Moderate.
9B, 9C---------- Brentsville	C	None--------	---	---	>6.0	---	---	20-40	Hard	Moderate	High-----	High.
10B, 10C---------- Buckhall	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
11B---------- Calverton	C	None--------	---	---	1.0-2.0	Perched	Dec-May	40-60	Soft	High-----	Moderate	High.
12D---------- Catlett	C/D	None--------	---	---	>6.0	---	---	10-20	Soft	Moderate	Low------	High.
13B*, 13C*: Catlett----------	C/D	None--------	---	---	>6.0	---	---	10-20	Soft	Moderate	Low------	High.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
13B*, 13C*: Sycoline	D	None	---	---	1.5-3.0	Perched	Nov-May	20-40	Hard	High	Moderate	Moderate.
14A Codorus	C	Frequent	Very brief	Dec-Apr	1.0-2.0	Apparent	Nov-Apr	>60	---	High	High	Moderate.
15A Comus	B	Frequent	Very brief	Feb-May	>6.0	---	---	>60	---	Moderate	Low	High.
16A Delanco	C	Rare	---	---	1.0-2.5	Apparent	Dec-Apr	>60	---	High	High	High.
17A Dulles	D	None	---	---	1.0-2.5	Apparent	Nov-Mar	40-60	Hard	High	High	High.
18C, 18D, 18E Dumfries	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	High.
19B, 19C Elioak	C	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
20B Elsinboro	B	Rare	---	---	>5.0	---	---	>60	---	Moderate	Moderate	High.
21B, 21C Fairfax	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	High.
22A Featherstone	D	Frequent	Very brief	Sep-Mar	+1-0	Apparent	Nov-Mar	>60	---	---	High	High.
23C, 23D, 23E Gaila	B	None	---	---	>6.0	---	---	>60	---	Moderate	Low	High.
24B*, 24C*, 24D*: Glenelg	B	None	---	---	>6.0	---	---	>60	---	Moderate	Low	High.
Buckhall	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
25A Glenville	C	None	---	---	0.5-3.0	Perched	Nov-Apr	>60	---	High	High	Moderate.
26A Hatboro	D	Frequent	Very brief	Nov-May	0-0.5	Apparent	Oct-May	>60	---	High	High	Moderate.
27A*: Hatboro	D	Frequent	Very brief	Nov-May	0-0.5	Apparent	Oct-May	>60	---	High	High	Moderate.
Codorus	C	Frequent	Very brief	Dec-Apr	1.0-2.0	Apparent	Nov-Apr	>60	---	High	High	Moderate.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
28B, 28C---------- Haymarket	D	None--------	---	---	>6.0	---	---	>60	---	High-----	High-----	Low.
29B---------- Hoadly	C	None--------	---	---	0.5-1.5	Perched	Nov-Jun	>60	---	Moderate	High-----	High.
30B---------- Jackland	D	None--------	---	---	1.0-2.0	Perched	Dec-Apr	>60	---	High-----	High-----	Low.
31B*, 31C*: Jackland---------	D	None--------	---	---	1.0-2.0	Perched	Dec-Apr	>60	---	High-----	High-----	Low.
Haymarket--------	D	None--------	---	---	>6.0	---	---	>60	---	High-----	High-----	Low.
32A---------- Kelly	D	None--------	---	---	1.5-2.5	Apparent	Nov-Mar	40-60	Hard	Moderate	High-----	High.
33B*, 33C*, 33D*: Legore----------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
33B*, 33C*, 33D*: Oakhill----------	B	None--------	---	---	>6.0	---	---	20-40	Soft	Moderate	Moderate	Moderate.
34B, 34C, 34D----- Lunt	C	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	High.
35B---------- Manassas	B	Rare--------	---	---	2.0-3.0	Apparent	Dec-May	>60	---	Moderate	High-----	High.
36D, 36E---------- Marr	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	High.
37A---------- Marumsco	C	None--------	---	---	1.0-1.5	Apparent	Nov-Mar	>60	---	High-----	High-----	High.
38B---------- Meadowville	B	None--------	---	---	3.0-5.0	Apparent	Dec-May	>60	---	Moderate	High-----	High.
39B3, 39C3-------- Minnieville	C	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Moderate.
40B, 40C---------- Montalto	C	None--------	---	---	>5.0	---	---	>60	---	Moderate	High-----	High.
41B, 41C---------- Neabsco	C	None--------	---	---	1.0-2.5	Perched	Nov-Apr	>60	---	High-----	Moderate	Moderate.
42B*: Neabsco----------	C	None--------	---	---	1.0-2.5	Perched	Nov-Apr	>60	---	High-----	Moderate	Moderate.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
42B*: Quantico	B	None	---	---	>6.0	---	---	>60	---	High	High	High.
43D, 43E--- Nestoria	C/D	None	---	---	>6.0	---	---	10-20	Soft	Moderate	Moderate	Moderate.
44D, 44E--- Occoquan	B	None	---	---	>6.0	---	---	40-60	Soft	Moderate	Moderate	High.
45C--- Orenda	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
46B, 46C--- Panorama	B	None	---	---	>6.0	---	---	40-60	Soft	High	Moderate	Moderate.
47B, 47C, 47D--- Quantico	B	None	---	---	>6.0	---	---	>60	---	High	High	High.
48A--- Reaville	C	None	---	---	0.5-3.0	Apparent	Nov-Mar	20-40	Soft	High	High	Moderate.
49A--- Rowland	C	Frequent	Brief	Nov-Mar	1.0-3.0	Apparent	Nov-May	>60	---	High	High	Moderate.
50D, 50E--- Spriggs	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	Low	Moderate.
51D, 51E--- Stumptown	B	None	---	---	>6.0	---	---	20-40	Hard	Moderate	Moderate	Moderate.
52B*, 52C*: Sudley	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
Oatlands	B	None	---	---	>6.0	---	---	20-40	Hard	Moderate	Moderate	Moderate.
53B*, 53C*: Sycoline	D	None	---	---	1.5-3.0	Perched	Nov-May	20-40	Hard	High	Moderate	Moderate.
Kelly	D	None	---	---	1.5-2.5	Apparent	Nov-Mar	40-60	Hard	Moderate	High	High.
54B*: Urban land. Udorthents.												
55D, 55E--- Watt	D	None	---	---	>6.0	---	---	20-40	Soft	---	High	High.
56A--- Waxpool	D	None	---	---	0-1.0	Apparent	Nov-May	>60	---	High	High	Moderate.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Aden	Fine, mixed, mesic Aeric Ochraqualfs
Airmont	Loamy-skeletal, mixed, mesic Typic Fragiudults
Albano	Fine, mixed, mesic Typic Ochraqualfs
Arcola	Fine-loamy, mixed, mesic Typic Hapludults
Baile	Fine-loamy, mixed, mesic Typic Ochraquults
Bermudian	Fine-loamy, mixed, mesic Fluventic Dystrochrepts
Braddock	Clayey, mixed, mesic Typic Hapludults
Brentsville	Coarse-loamy, mixed, mesic Typic Hapludults
Buckhall	Clayey, mixed, mesic Typic Hapludults
Calverton	Fine-loamy, mixed, mesic Aquic Fragiudults
Catlett	Loamy-skeletal, mixed, mesic, shallow Ultic Hapludalfs
Codorus	Fine-loamy, mixed, mesic Fluvaquentic Dystrochrepts
Comus	Coarse-loamy, mixed, mesic Fluventic Dystrochrepts
Delanco	Fine-loamy, mixed, mesic Aquic Hapludults
Dulles	Fine, vermiculitic, mesic Aquultic Hapludalfs
Dumfries	Fine-loamy, mixed, mesic Ultic Hapludalfs
Elioak	Clayey, kaolinitic, mesic Typic Hapludults
Elsinboro	Fine-loamy, mixed, mesic Typic Hapludults
Fairfax	Clayey, mixed, mesic Typic Hapludults
Featherstone	Fine-loamy, mixed, acid, thermic Typic Hydraquents
Gaila	Fine-loamy, mixed, mesic Ochreptic Hapludults
Glenelg	Fine-loamy, mixed, mesic Typic Hapludults
Glenville	Fine-loamy, mixed, mesic Aquic Fragiudults
Hatboro	Fine-loamy, mixed, nonacid, mesic Typic Fluvaquents
Haymarket	Fine, montmorillonitic, mesic Typic Hapludalfs
Hoadly	Fine-loamy, siliceous, mesic Aquic Fragiudalfs
Jackland	Fine, montmorillonitic, mesic Aquic Hapludalfs
Kelly	Fine, vermiculitic, mesic Aquic Hapludalfs
Legore	Fine-loamy, mixed, mesic Ultic Hapludalfs
Lunt	Fine, montmorillonitic, mesic Typic Hapludalfs
Manassas	Fine-loamy, mixed, mesic Ultic Hapludalfs
Marr	Fine-loamy, siliceous, mesic Typic Hapludults
Marumsco	Clayey, montmorillonitic, thermic Aquic Hapludults
Meadowville	Fine-loamy, mixed, mesic Typic Hapludults
Minnieville	Clayey, kaolinitic, mesic Typic Hapludults
Montalto	Fine, mixed, mesic Ultic Hapludalfs
Neabsco	Fine-loamy, siliceous, mesic Typic Fragiudults
Nestoria	Loamy-skeletal, mixed, mesic, shallow Ultic Hapludalfs
Oakhill	Loamy-skeletal, mixed, mesic Typic Hapludalfs
Oatlands	Fine-loamy, mixed, mesic Ultic Hapludalfs
Occoquan	Fine-loamy, mixed, mesic Ochreptic Hapludults
Orenda	Fine, mixed, mesic Ultic Hapludalfs
Panorama	Fine-loamy, mixed, mesic Ultic Hapludalfs
Quantico	Clayey, mixed, mesic Typic Hapludults
Reaville	Fine-loamy, mixed, mesic Aquic Hapludalfs
Rowland	Fine-loamy, mixed, mesic Fluvaquentic Dystrochrepts
Spriggs	Fine-loamy, mixed, mesic Ultic Hapludalfs
Stumptown	Loamy-skeletal, mixed, mesic Ochreptic Hapludults
Sudley	Fine-loamy, mixed, mesic Ultic Hapludalfs
Sycoline	Fine-loamy, mixed, mesic Aquultic Hapludalfs
Udorthents	Udorthents
Watt	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Waxpool	Fine, montmorillonitic, mesic Albaquic Hapludalfs
Weverton	Loamy-skeletal, mixed, mesic Typic Hapludults

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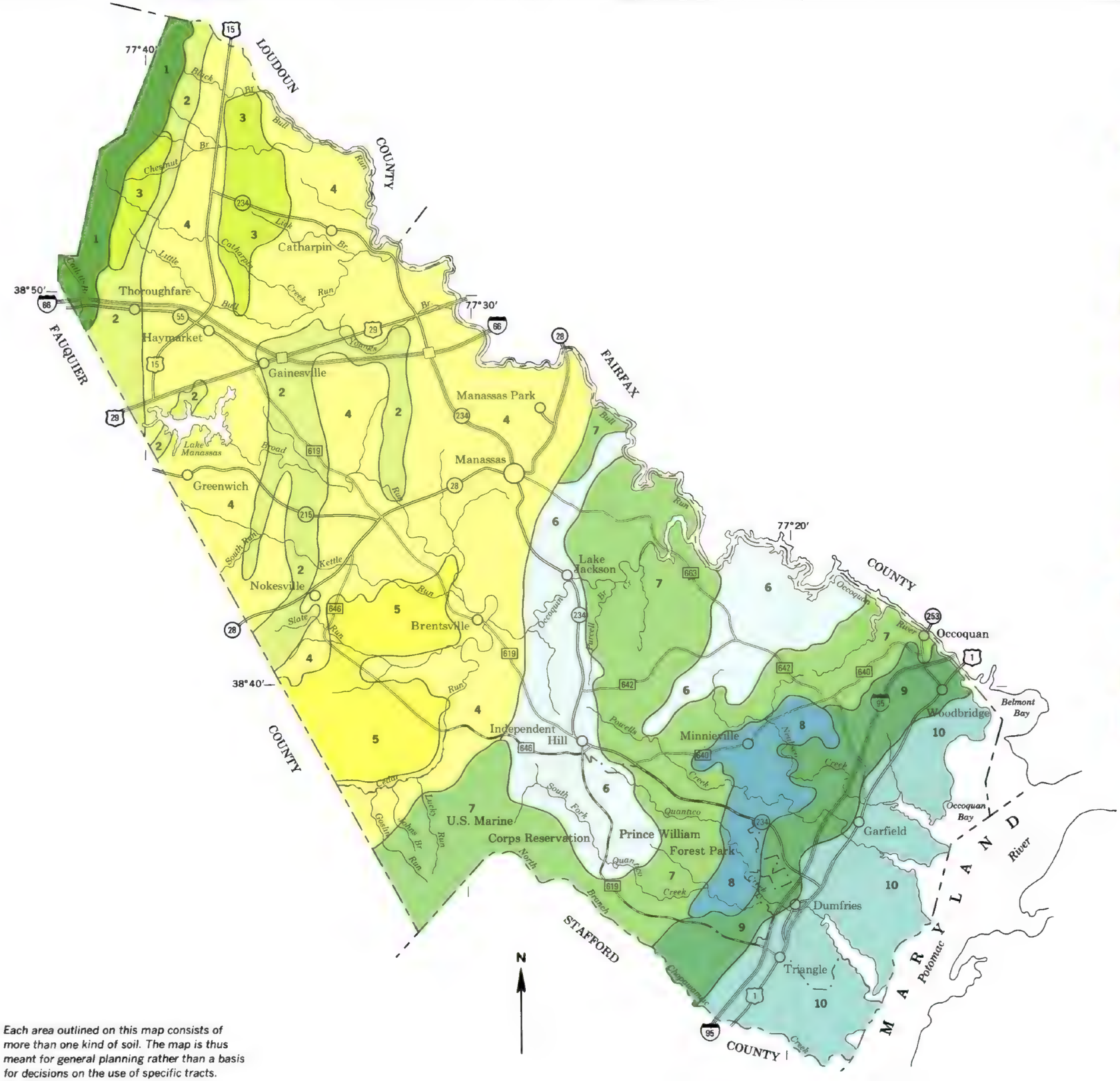


Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

LEGEND

SOILS ON BULL RUN MOUNTAIN THAT FORMED IN RESIDUUM OF INTERBEDDED QUARTZITES AND MUSCOVITE SCHISTS

1 — AIRMONT-WEVERTON-STUMPTOWN: Very deep and moderately deep, moderately well drained and well drained soils that have a loamy subsoil and many flagstones

SOILS ON THE PIEDMONT PLATEAU THAT FORMED IN RESIDUUM OF SEDIMENTARY ROCKS OF SILTSTONE, SANDSTONE CONGLOMERATE, AND BASIC ROCKS OF DIABASE AND BASALT

2 — JACKLAND-WAXPOOL-LEGORE: Very deep, poorly drained to well drained soils that have a clayey or loamy subsoil

3 — SUDLEY-OATLANDS-MANASSAS: Very deep and moderately deep, well drained and moderately well drained soils that have a loamy subsoil

4 — ARCOLA-PANORAMA-NESTORIA: Moderately deep, deep, and shallow soils that are well drained and have a loamy subsoil

5 — DULLES-REAVILLE-ALBANO: Deep and moderately deep, moderately well drained to poorly drained soils that have a clayey or loamy subsoil

SOILS ON THE PIEDMONT PLATEAU UPLANDS THAT FORMED IN RESIDUUM OF METAMORPHIC ROCKS OF MUSCOVITE SCHIST, GRANITE GNEISS AND HORNBLENDE GNEISS, AND SCHIST

6 — BUCKHALL-GLENELG-OCCOQUAN: Very deep and deep, well drained and somewhat excessively drained soils that have a clayey or loamy subsoil

7 — GAILA-BUCKHALL-OCCOQUAN: Very deep and deep, well drained and somewhat excessively drained soils that have a loamy subsoil

8 — SPRIGGS-ORENDA-MINNIEVILLE: Moderately deep and very deep, well drained soils that have a loamy or clayey subsoil

COASTAL PLAIN SOILS THAT FORMED IN FLUVIOMARINE SEDIMENTS OF SAND, SILT, CLAY, AND GRAVEL

9 — NEABSCO-QUANTICO-DUMFRIES: Very deep, moderately well drained or well drained soils that have a loamy or clayey subsoil

10 — DUMFRIES-LUNT-MARR: Very deep, well drained soils that have a loamy or clayey subsoil

COMPILED 1985

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

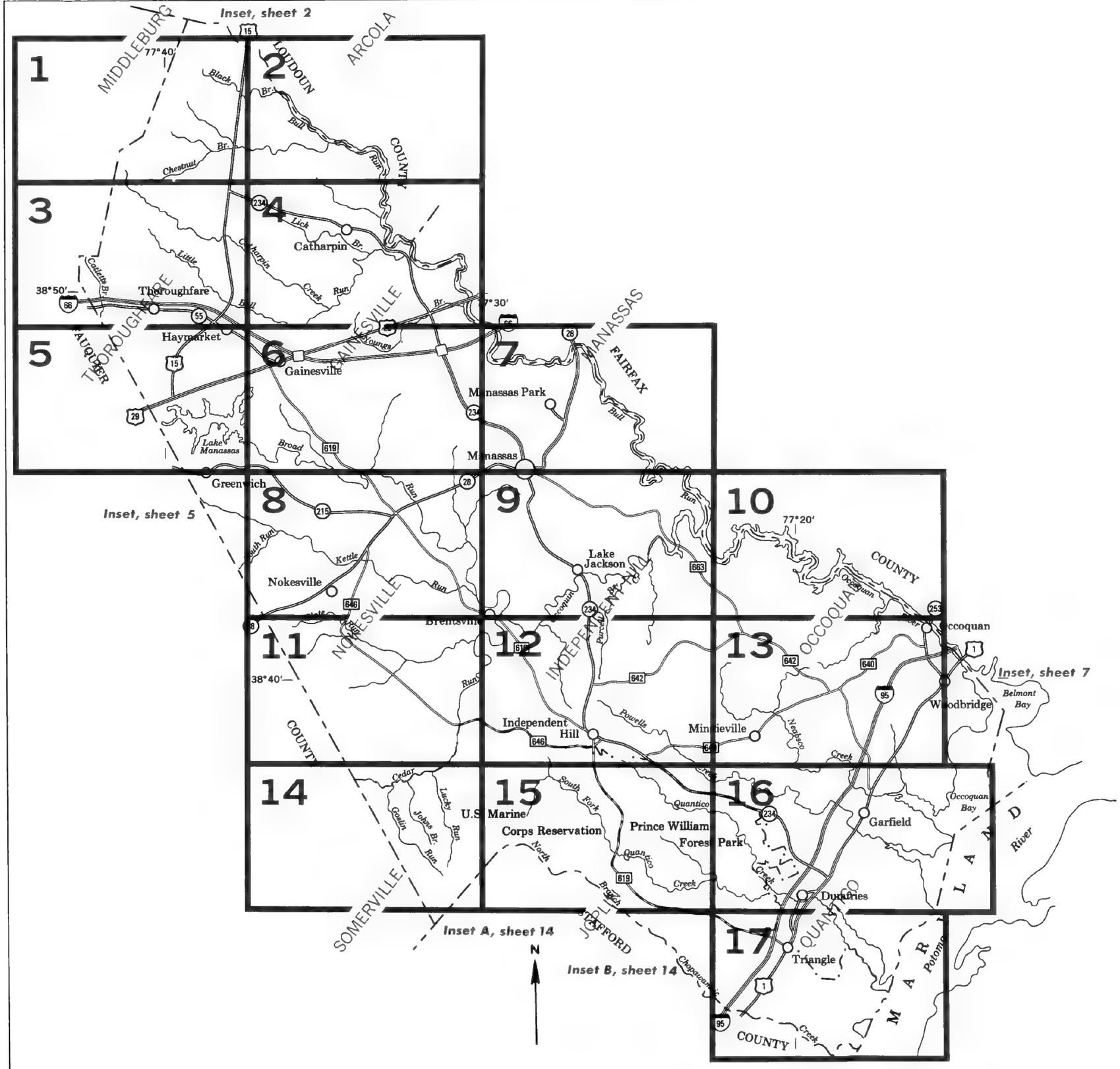
GENERAL SOIL MAP

PRINCE WILLIAM COUNTY, VIRGINIA

Scale 1:190,080

1 0 1 2 3 Miles

1 0 3 6 Km



INDEX TO MAP SHEETS

PRINCE WILLIAM COUNTY, VIRGINIA

Scale 1:190,080

1 0 1 2 3 Miles

1 0 3 6 Km

SOIL LEGEND

Publication symbols consist of numbers or a combination of numbers and letters (e.g., 1A, 24C, or 55E. The initial numbers represent the kinds of soil. A capital letter of A, B, C, D, or E, following the first number indicates the class of slope. A final number 3, indicates the unit is severely eroded.

SYMBOL	NAME
1A	Aden silt loam, 0 to 2 percent slopes
2B	Airmont-Weverton complex, 2 to 7 percent slopes
2C	Airmont-Weverton complex, 7 to 15 percent slopes
2D	Airmont-Weverton complex, 15 to 25 percent slopes
2E	Airmont-Weverton complex, 25 to 50 percent slopes
3A	Albano silt loam, 0 to 4 percent slopes
4B	Arcola silt loam, 2 to 7 percent slopes
5C	Arcola-Nestoria complex, 7 to 15 percent slopes
5D	Arcola-Nestoria complex, 15 to 25 percent slopes
6A	Baile loam, 0 to 4 percent slopes
7A	Bermudian silt loam, 0 to 2 percent slopes
8C	Braddock loam, 7 to 15 percent slopes
9B	Brentsville sandy loam, 2 to 7 percent slopes
9C	Brentsville sandy loam, 7 to 15 percent slopes
10B	Buckhall loam, 2 to 7 percent slopes
10C	Buckhall loam, 7 to 15 percent slopes
11B	Calverton silt loam, 0 to 7 percent slopes
12D	Catlett gravelly silt loam, 15 to 25 percent slopes
13B	Catlett-Sycoline complex, 2 to 7 percent slopes
13C	Catlett-Sycoline complex, 7 to 15 percent slopes
14A	Codorus loam, 0 to 2 percent slopes
15A	Comus loam, 0 to 2 percent slopes
16A	Delanco fine sandy loam, 0 to 4 percent slopes
17A	Dulles silt loam, 0 to 4 percent slopes
18C	Dumfries sandy loam, 7 to 15 percent slopes
18D	Dumfries sandy loam, 15 to 25 percent slopes
18E	Dumfries sandy loam, 25 to 50 percent slopes
19B	Elioak loam, 2 to 7 percent slopes
19C	Elioak loam, 7 to 15 percent slopes
20B	Elsinboro sandy loam, 2 to 7 percent slopes
21B	Fairfax loam, 2 to 7 percent slopes
21C	Fairfax loam, 7 to 15 percent slopes
22A	Featherstone silt loam, 0 to 1 percent slopes
23C	Gaila sandy loam, 7 to 15 percent slopes
23D	Gaila sandy loam, 15 to 25 percent slopes
23E	Gaila sandy loam, 25 to 50 percent slopes
24B	Glenelg-Buckhall complex, 2 to 7 percent slopes
24C	Glenelg-Buckhall complex, 7 to 15 percent slopes
24D	Glenelg-Buckhall complex, 15 to 25 percent slopes
25A	Glenville loam, 0 to 4 percent slopes
26A	Hatboro silt loam, 0 to 2 percent slopes
27A	Hatboro-Codorus complex, 0 to 2 percent slopes
28B	Haymarket silt loam, 2 to 7 percent slopes
28C	Haymarket silt loam, 7 to 15 percent slopes
29B	Hoadly loam, 2 to 7 percent slopes

SYMBOL	NAME
30B	Jackland silt loam, 2 to 7 percent slopes
31B	Jackland-Haymarket complex, 2 to 7 percent slopes
31C	Jackland-Haymarket complex, 7 to 15 percent slopes
32A	Kelly silt loam, 0 to 2 percent slopes
33B	Legore-Oakhill complex, 2 to 7 percent slopes
33C	Legore-Oakhill complex, 7 to 15 percent slopes
33D	Legore-Oakhill complex, 15 to 25 percent slopes
34B	Lunt loam, 2 to 7 percent slopes
34C	Lunt loam, 7 to 15 percent slopes
34D	Lunt loam, 15 to 25 percent slopes
35B	Manassas silt loam, 2 to 7 percent slopes
36D	Marr very fine sandy loam, 7 to 25 percent slopes
36E	Marr very fine sandy loam, 25 to 50 percent slopes
37A	Marumsco loam, 0 to 4 percent slopes
38B	Meadowville loam, 0 to 5 percent slopes
39B3	Minnieville clay loam, 2 to 7 percent slopes, severely eroded
39C3	Minnieville clay loam, 7 to 15 percent slopes, severely eroded
40B	Montalto silty clay loam, 2 to 7 percent slopes
40C	Montalto silty clay loam, 7 to 15 percent slopes
41B	Neabsco loam, 0 to 7 percent slopes
41C	Neabsco loam, 7 to 15 percent slopes
42B	Neabsco-Quantico complex, 2 to 7 percent slopes
43D	Nestoria gravelly silt loam, 7 to 25 percent slopes
43E	Nestoria gravelly silt loam, 25 to 50 percent slopes
44D	Occoquan sandy loam, 7 to 25 percent slopes
44E	Occoquan sandy loam, 25 to 50 percent slopes
45C	Orenda loam, 7 to 15 percent slopes
46B	Panorama silt loam, 2 to 7 percent slopes
46C	Panorama silt loam, 7 to 15 percent slopes
47B	Quantico sandy loam, 2 to 7 percent slopes
47C	Quantico sandy loam, 7 to 15 percent slopes
47D	Quantico sandy loam, 15 to 25 percent slopes
48A	Reaville silt loam, 0 to 4 percent slopes
49A	Rowland silt loam, 0 to 2 percent slopes
50D	Spriggs silt loam, 15 to 25 percent slopes
50E	Spriggs silt loam, 25 to 50 percent slopes
51D	Stumptown very flaggy loam, 7 to 25 percent slopes
51E	Stumptown very flaggy loam, 25 to 50 percent slopes
52B	Sudley-Oatlands complex, 2 to 7 percent slopes
52C	Sudley-Oatlands complex, 7 to 15 percent slopes
53B	Sycoline-Kelly complex, 2 to 7 percent slopes
53C	Sycoline-Kelly complex, 7 to 15 percent slopes
54B	Urban land-Udorthents complex, 0 to 7 percent slopes
55D	Watt channery silt loam, 15 to 25 percent slopes
55E	Watt channery silt loam, 25 to 50 percent slopes
56A	Waxpool silt loam, 0 to 2 percent slopes

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline and neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool (Swift Airport; FLOOD POOL LINE)

STATE COORDINATE TICK

LAND DIVISION CORNER (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate (21)
- Federal (173)
- State (28)
- County, farm or ranch (1283)

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or Small (water; W)

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label) (Indian Mound)
- Located object (label) (Tower)
- Tank (label) (Gas)
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) (CANAL)
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial (water; W)
- Intermittent (int; I)

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

- SOIL DELINEATIONS AND SYMBOLS (9C; 12D)
- ESCARPMENTS
  - Bedrock (points down slope)
  - Other than bedrock (points down slope)
- SHORT STEEP SLOPE
- GULLY
- DEPRESSION OR SINK
- SOIL SAMPLE (normally not shown)
- MISCELLANEOUS
  - Blowout
  - Clay spot
  - Gravelly spot
  - Gumbo, slick or scabby spot (sodic)
  - Dumps and other similar non soil areas
  - Prominent hill or peak
  - Rock outcrop (includes sandstone and shale)
  - Saline spot
  - Sandy spot
  - Severely eroded spot
  - Slide or slip (tips point upslope)
  - Stony spot, very stony spot

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF
PRINCE WILLIAM COUNTY, VIRGINIA
SHEET NUMBER 1

N

2 215 000 FEET

460 000 FEET

(Joins inset, sheet 2)

LOUDOUN COUNTY

FAUQUIER COUNTY

Bull Run Mountain Estates

Bull Run Church

Hickory Grove

Cheshire

Culpeppin Creek

(Joins sheet 3)

(Joins sheet 2)

2 245 000 FEET

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SCALE 1:15 840

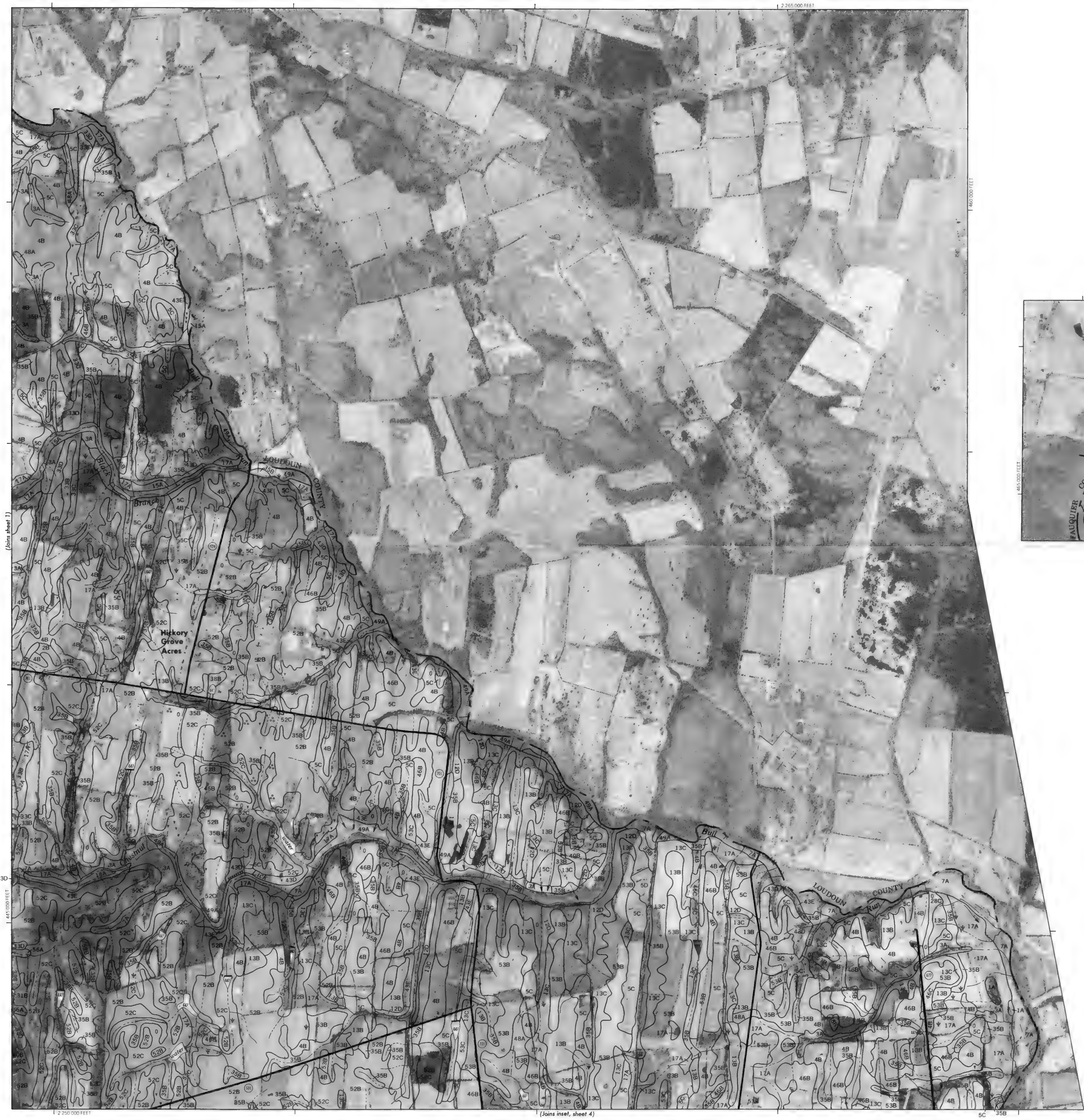
5000 Feet 4000 3000 2000 1000 0 1 Mile

1000 Meters 800 600 400 200 0 1 Kilometer

PRINCE WILLIAM COUNTY, VIRGINIA NO. 1

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF
PRINCE WILLIAM COUNTY, VIRGINIA
SHEET NUMBER 2



SCALE 1:15 840

5000 Feet 4000 3000 2000 1000 0 1 Mile

1000 Meters 800 600 400 200 0 1 Kilometer

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5000 Feet 4000 3000 2000 1000 0 1 Mile

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SOIL CONSERVATION SERVICE

SOIL SURVEY OF
PRINCE WILLIAM COUNTY, VIRGINIA
SHEET NUMBER 4

4
N

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SCALE 1:15 840

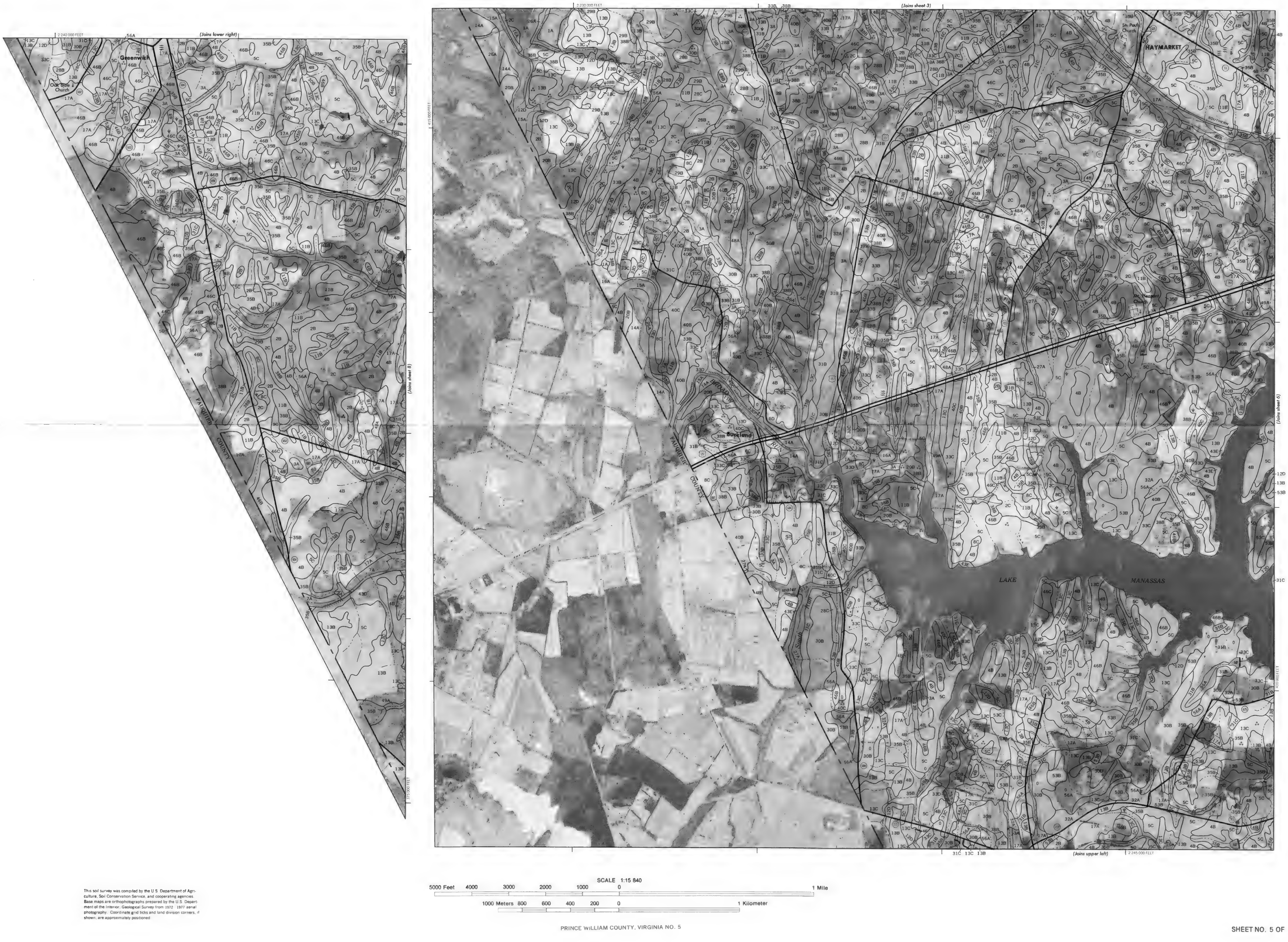
5000 Feet 4000 3000 2000 1000 0 1 Mile

1000 Meters 800 600 400 200 0 1 Kilometer

PRINCE WILLIAM COUNTY, VIRGINIA NO. 4

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF
PRINCE WILLIAM COUNTY, VIRGINIA
SHEET NUMBER 5



N

SCALE 1:15 840

5000 Feet 4000 3000 2000 1000 0 1 Mile

1000 Meters 800 600 400 200 0 1 Kilometer

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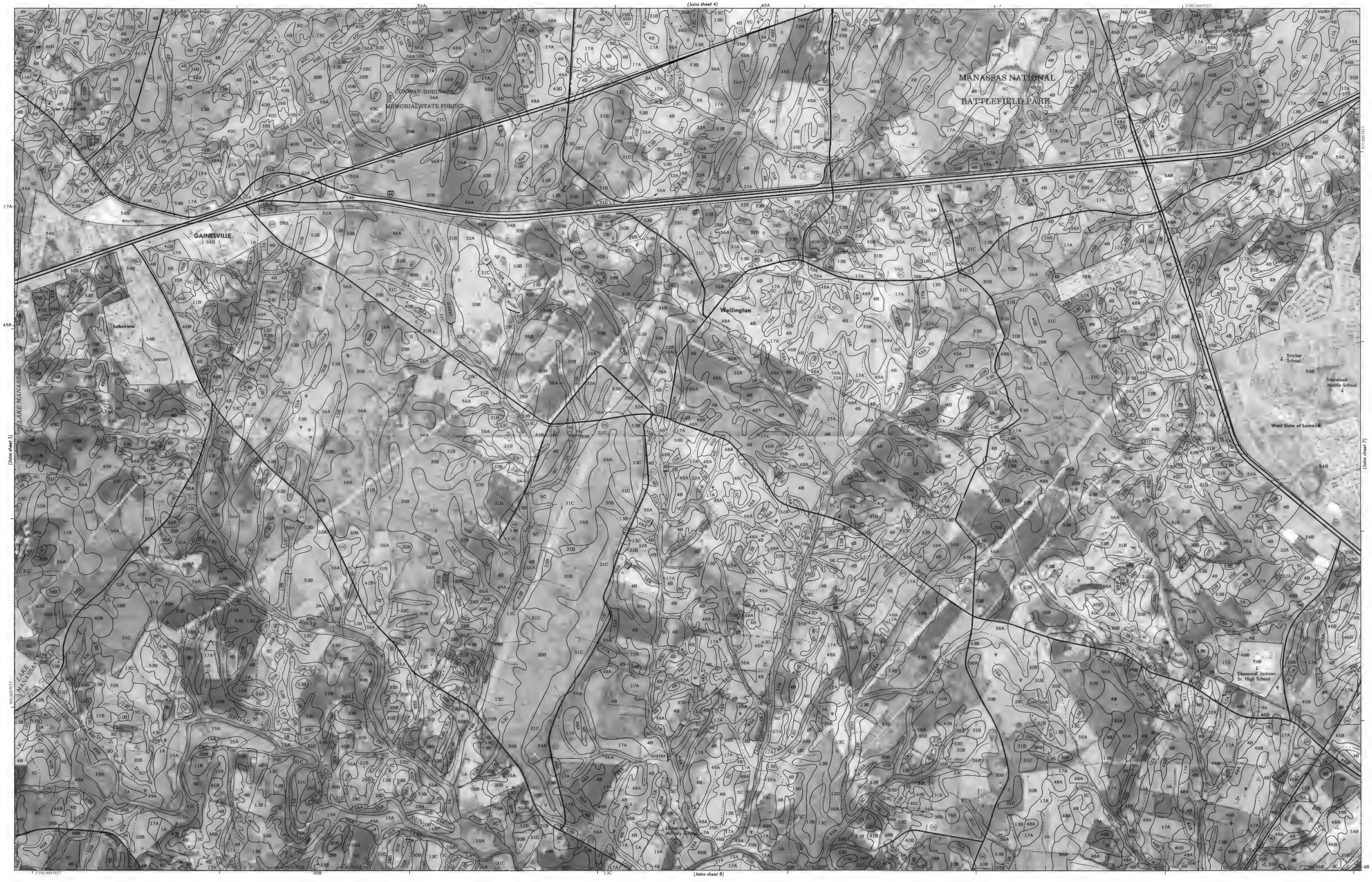

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SCALE 1:15 840

5000 Feet 4000 3000 2000 1000 0 1 Mile

1000 Meters 800 600 400 200 0 1 Kilometer

N

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SCALE 1:15 840

5000 Feet 4000 3000 2000 1000 0 1 Mile

1000 Meters 800 600 400 200 0 1 Kilometer

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF
PRINCE WILLIAM COUNTY, VIRGINIA
SHEET NUMBER 8

8
N

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SCALE 1:15 840

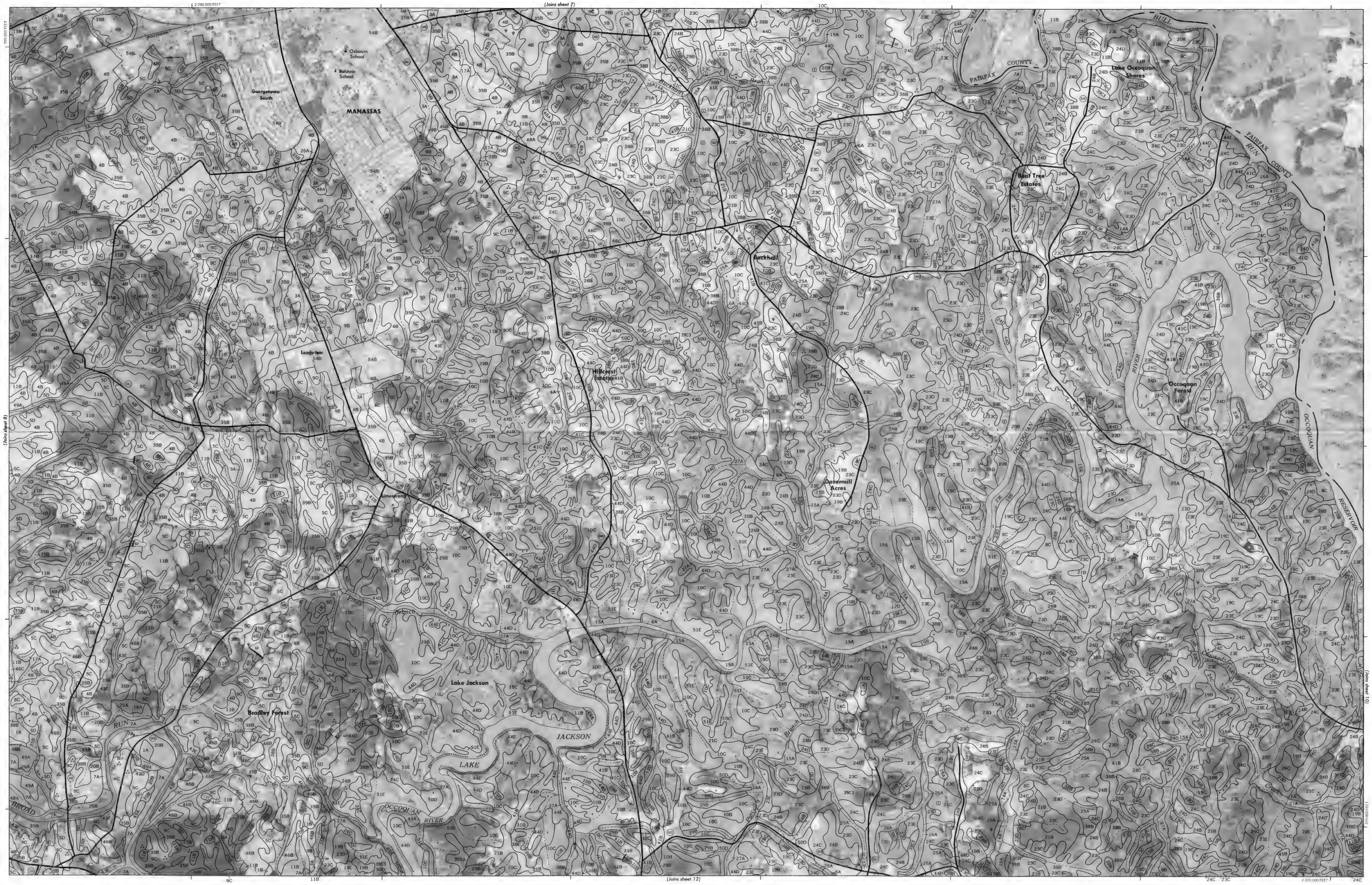
5000 Feet 4000 3000 2000 1000 0 1 Mile

1000 Meters 800 600 400 200 0 1 Kilometer

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF
PRINCE WILLIAM COUNTY, VIRGINIA
SHEET NUMBER 9

9
N



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SCALE 1:15 840

5000 Feet 4000 3000 2000 1000 0 1 Mile

1000 Meters 800 600 400 200 0 1 Kilometer

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF
PRINCE WILLIAM COUNTY, VIRGINIA
SHEET NUMBER 10

10
N

2 355 000 FEET

365 000 FEET

RIVER
OCCOQUAN
FAIRFAX COUNTY
OCCOQUAN
RESERVOIR
FAIRFAX COUNTY
LAKE
RIDGE
Occoquan Church

(Joins sheet 9)

375 000 FEET

24C 24D 24C 24D 23E

2 335 000 FEET

(Joins sheet 13)

41B

SCALE 1:15 840

5000 Feet 4000 3000 2000 1000 0 1 Mile

1000 Meters 800 600 400 200 0 1 Kilometer

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PRINCE WILLIAM COUNTY, VIRGINIA NO. 10

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF
PRINCE WILLIAM COUNTY, VIRGINIA
SHEET NUMBER 11

11
N

This soil survey was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey from 1972 - 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SCALE 1:15 840

5000 Feet 4000 3000 2000 1000 0 1 Mile

1000 Meters 800 600 400 200 0 1 Kilometer

PRINCE WILLIAM COUNTY, VIRGINIA NO. 11

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF
PRINCE WILLIAM COUNTY, VIRGINIA
SHEET NUMBER 12

12
N

SCALE 1:15 840

5000 Feet 4000 3000 2000 1000 0 1 Mile

1000 Meters 800 600 400 200 0 1 Kilometer

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SCALE 1:15 840

5000 Feet 4000 3000 2000 1000 0 1 Mile

1000 Meters 800 600 400 200 0 1 Kilometer

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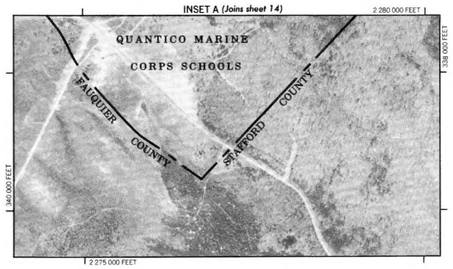
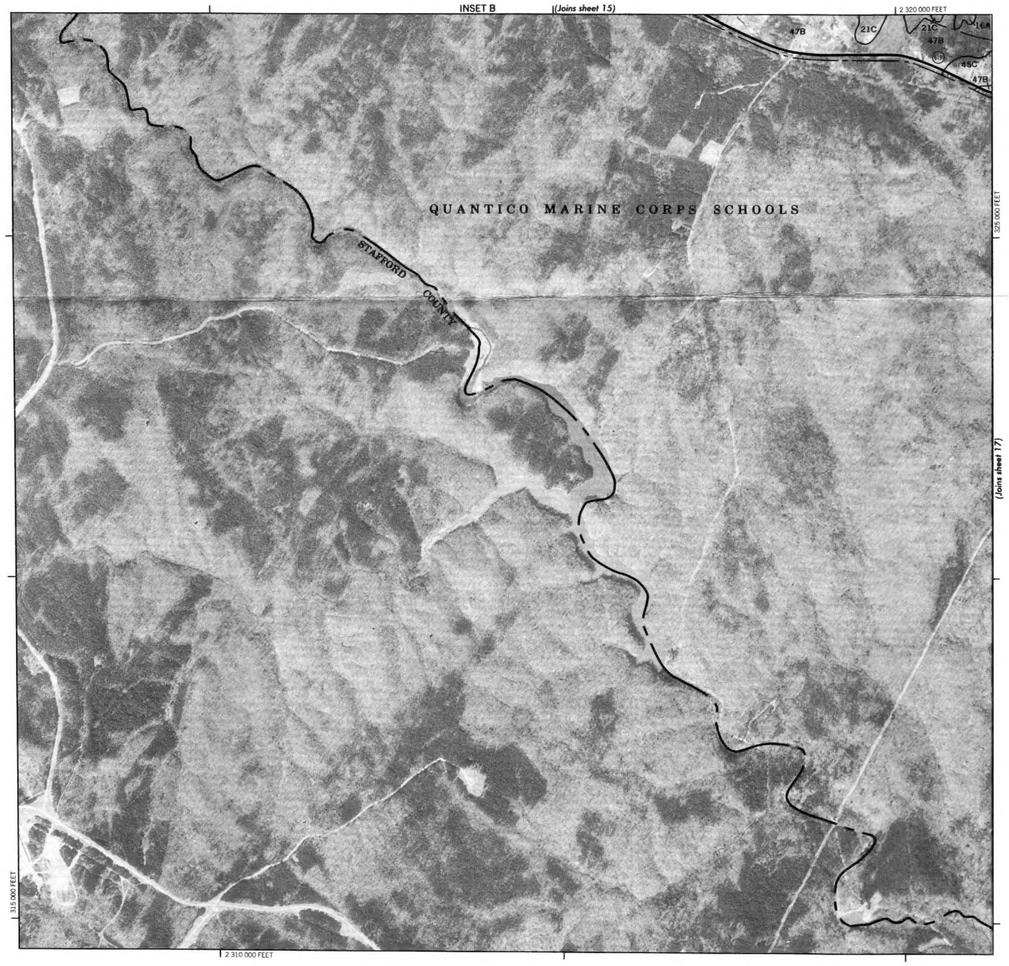
14
N

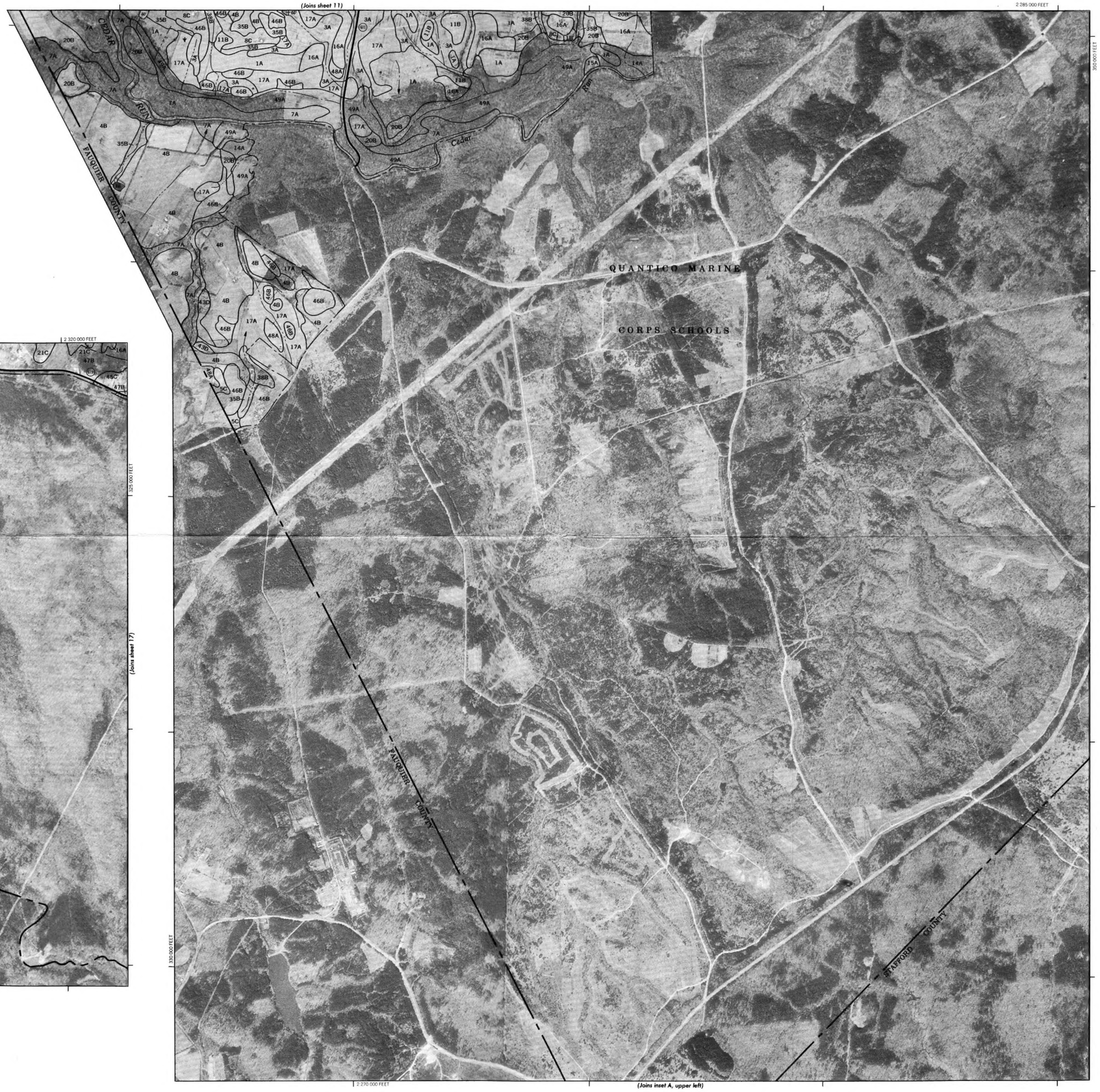
INSET A *(Joins sheet 14)*



INSET B *(Joins sheet 15)*



(Joins sheet 11)



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SCALE 1:15 840

5000 Feet 4000 3000 2000 1000 0 1 Mile

1000 Meters 800 600 400 200 0 1 Kilometer

2 290 000 FEET

(Joins sheet 12)

QUANTICO MARINE CORPS SCHOOLS

STAFFORD COUNTY

PRINCE WILLIAM FOREST PARK

Quantico

Powells Creek

Quantico Creek

South Fork Quantico Creek

Belmont Crossroads

Joplin

STAFFORD COUNTY

(Joins inset, sheet 14)

2 320 000 FEET

(Joins sheet 14)

(Joins sheet 16)

380 000 FEET

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SCALE 1:15 840

5000 Feet 4000 3000 2000 1000 0 1 Mile

1000 Meters 800 600 400 200 0 1 Kilometer

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF
PRINCE WILLIAM COUNTY, VIRGINIA
SHEET NUMBER 16

16
N

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SCALE 1:15 840

5000 Feet 4000 3000 2000 1000 0 1 Mile

1000 Meters 800 600 400 200 0 1 Kilometer

PRINCE WILLIAM COUNTY, VIRGINIA NO. 16

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF
PRINCE WILLIAM COUNTY, VIRGINIA
SHEET NUMBER 17

17

N

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SCALE 1:15 840

5000 Feet 4000 3000 2000 1000 0 1 Mile

1000 Meters 800 600 400 200 0 1 Kilometer

PRINCE WILLIAM COUNTY, VIRGINIA NO. 17

SHEET NO. 17 OF 17